CURATED PAST EXAM ITEMS
- Solutions -

CP 321 – Disability, Long-Term Care, and Long-Duration Health Contracts

Important Information:

- These curated past exam items are intended to allow candidates to focus on past SOA fellowship assessments. These items are organized by topic and learning objective with relevant learning outcomes, source materials, and candidate commentary identified. We have included items that are relevant in the new course structure, and where feasible we have made updates to questions to make them relevant.
- Where an item applies to multiple learning objectives, it has been placed under each applicable learning objective.
- Candidate solutions other than those presented in this material, if appropriate for the context, could receive full marks. For interpretation items, solutions presented in these documents are not necessarily the only valid solutions.
- Learning Outcome Statements and supporting syllabus materials may have changed since each exam was administered. New assessment items are developed from the current Learning Outcome Statements and syllabus materials. The inclusion in these curated past exam questions of material that is no longer current does not bring such material into scope for current assessments.
- Thus, while we have made our best effort and conducted multiple reviews, alignment with the current system or choice of classification may not be perfect. Candidates with questions or ideas for improvement may reach out to education@soa.org. We expect to make updates annually.

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Course CP 321
Curated Past Exam Solutions
Learning Objective #1: Plan and Product Provisions
Applicable SOA Questions: Fall 2020 to Fall 2024
Model Solutions

Contents

1. Fall 2023 DP #4a-c

SOA Commentary on Question:

This question evaluated understanding of the disability content in the syllabus.

Part a:

Source(s): Skwire 25 – Disability Claim Costs

Question: Describe the advantages to employees and employers of PQR assisting employees in applying for Social Security disability benefits.

SOA Commentary on Question:

Most candidates stated an advantage is the offset of the disability benefit, with some candidates connecting that to reduced premiums, which also earned credit. Other correct responses also received full credit. No credit was provided to listed disadvantages.

SOA Answer:

For the employer, the SSDI benefit offsets the benefit provided by the disability plan. For disabled employees qualifying for SSDI, they will get higher income replacement as SSDI is not fully taxed, continue to earn SS credits, and may qualify for Medicare.

Part b:

Source(s): Leida 2 – The Products

Question: List and describe the three major renewability clauses for individual disability products by completing the following table:

SOA Commentary on Question:

Many candidates did well on this part of the question. Full credit was given if the descriptions were provided in the correct order, even if some of the names of the clauses were not recalled. Partial credit was given to those who did not recall the premium aspect of risk in non-cancellable versus guarantee renewable.

SOA Answer:

Financial Risk to Insurer	Renewability Clause	Description
Least	Conditionally renewable	There are situations in which this product does not need to be renewed by the insurer
Middle	Guaranteed renewable	Must renew policyholders, but can increase rates
Most	Non-cancellable	Guarantee renewal and premiums cannot change from initial offer

Part c:

Source(s): Skwire 12 – Group Disability Benefits

Question: Explain adverse selection concerns for the following optional Group LTD benefit features: (i) Portability and (ii) Conversion Option

SOA Commentary on Question:

Few candidates cited the risk to PQR. Many candidates received partial credit for understanding that portability continues group coverage and sicker people tend to use this option. Some candidates did not recall that conversion is from group to individual.

SOA Answer:

(i) **Portability:** Employees leaving an employer and paying to continue the group LTD benefit through the portability option tend to be sicker.

(ii) **Conversion Option:** Like portability, employees leaving an employer and paying to continue LTD benefits through the insurer's individual line tend to be sicker and thus more costly. This is particularly more risky to the insurer than portability, since the individual products are individually underwritten (and healthier lives) and much of the long-term effect of conversion population cannot be continually assessed back to the employer in terms of premium rates.

2. Spring 2024 DP #2a-b

Part a:

Source(s): Critical Illness Turns 40!

Question: (i) Calculate the lifetime present value of claim costs. Show your work. (ii) Create a sensitivity test for the lapse rate. (iii) Explain the relationship between the lapse rate and the cost of providing coverage. (iv) Describe considerations when setting lapse rate assumptions for policies sold at the employees' worksite.

SOA Commentary on Question:

For part (i), credit was awarded if candidates discounted from the middle of the year or if lapse was assumed at the end of the year rather than the beginning of the year as the solution assumes. The same commentary holds for part ii. Candidates performed well on part iii. For part iv, some candidates discussed setting lapse rate assumptions in general versus critical illness lapse assumptions for policies sold at a worksite.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part b:

Source(s): Critical Illness Turns 40!

Question: Calculate the rate increase based on historical experience. State your assumptions. Show your work.

SOA Commentary on Question:

Some candidates stated an assumed target loss ratio and received credit for calculating the rate increase in this manner.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

3. Fall 2022 SPC #4a-b

Part a:

Source(s): Eaton 2 – History of LTC Products

Question: Identify why long-term care insurance assumptions have typically resulted in underpricing the product.

SOA Commentary on Question:

Candidates generally performed well on this part of the question.

SOA Answer:

- It is a new product and insurers did not have sufficient experience on which to base their assumptions
- Basing assumptions on similar products was not always appropriate
- Claim events are typically in the distant future
- Companies used less margin of safety than prudent

Part b:

Source(s): Eaton 2 – History of LTC Products

Question: Evaluate the accuracy of the following statements. Justify your response.

(i) Higher than expected lapse rates contributed to the insolvency of some long-term care insurers.

(ii) Lower than expected interest rates in the future can be problematic for long-term care insurers.

(iii) A long-term care insurer entering into rehabilitation can put a policyholder in a bind.

SOA Commentary on Question:

Candidates did not earn points for merely stating True or False. The candidate needed to provide an explanation for each response to earn full credit.

SOA Answer:

(i) This statement is inaccurate/FALSE

- Long-Term Care (LTC) is a "lapse-supported" product and is significantly prefunded
- It is expected that a portion of policyholders will discontinue their policy early without making any claims.
- The premiums collected from these policyholders subsidize those remaining
- If too few policyholders do not lapse then this "lapse support" does not materilize

(ii) This statement is accurate/TRUE

- LTC insurers have difficulty buying assets with maturities long enough to match liabilities that extend many years into the future
- As assets mature sooner than liabilities, they will have to reinvested at lower than expected interest rates
- As a result, these assets reinvested at lower rates are not sufficient to fund future liabilities

(iii) This statement is accurate/TRUE

- The policyholder has two choices – terminate their policy or continue paying premiums
- If the policyholder terminates the policy, they lose the value of prefunding from the premiums already paid and become uninsured.
- If the policyholder continues paying premiums and rehabiliation fails, the insurer might be liquidated and the policyholder only receives a fraction of the amount owed from assets remaining plus payment from the state guaranty funds

Course CP 321
Curated Past Exam Solutions
Learning Objective #2: Manual Rates
Applicable SOA Questions: Fall 2020 to Fall 2024
Solutions

Contents

1. Fall 2020 DP-A #3

Part a:

Source(s): CP321-102-25 – Short Term Disability

Question: Describe rating factors used in a short-term disability renewal rate development.

SOA Commentary on Question:

Candidates performed well on this part of the question and were able to describe the rating factors used in a short-term disability renewal rate development as noted in the study note.

SOA Answer:

1. Retention and base rate increase (%) – assumed retention factors will influence the renewal rate of disability plans. Persistency / lapse rate can be used to derive retention factors.
2. Age/Gender – there is a strong correlation between disability incidence/severity and the age/gender of the covered population
3. Area – the type and likelihood of disability is influenced by geography
4. Group size – there is a correlation between short-term disability plan and the size of the group
5. Industry – incidence of disability is higher for blue collar workforce
6. Contribution and Employee Participation – employer contribution lowers adverse selection and results in lower cost for disability plans

Part b:

Source(s): CP321-102-25 – Short Term Disability

Question: Compare the actual 2019 profit results to the assumed 2019 profit. Show your work.

SOA Commentary on Question:

Most candidates received full credit for this part of the question. Full credit was given to candidates who compared actual vs. assumed cost and determined the actual profit is $700,000 higher than assumed.

SOA Answer:

2019 Experience		Underwriting Assumptions		Difference
Premiums	$10,000,000			
Incurred Benefit Claims	$7,500,000	80%	$8,000,000	($500,000)
Administration	$1,100,000	13%	$1,300,000	($200,000)
Premium Taxes	$200,000	2%	$200,000	$0
Risk and Profit	$1,200,000	5%	$500,000	$700,000

Claims came in at a 75% loss ratio vs. an assumed 80% loss ratio; claims are lower than expected by $500,000.

Administration costs came in at 11% of premium, below the underwriting assumption of 13%; administration costs are lower than expected by $200,000.

As a result, profit came in higher than expected by $700,000.

Part c:

Source(s): CP321-102-25 – Short Term Disability

Question: Recommend factors for 2021 for: Retention, Base rate increase, Age/gender and area factors

SOA Commentary on Question:

Most candidates received full credit for part (i) retention. The candidate can assign partial or full credibility to the claim experience in 2019 to arrive at a recommendation for the retention factors in 2021.

Candidates did not perform well on the second part of the question and did not use the recommended retention factors from part (i) to arrive at the answer.

Candidates did not perform well on the third part of the question. The calculations for each age/gender category show that the desired loss ratio of 75% was achieved. Therefore, there is no need to change the age/gender factor. Candidates who showed work and noted that no change is required received full credit.

Regarding area factors, many candidates derived the area factor as the ratio of claims and premiums for each region and then blended these area factors with the 2019 area factors.

SOA Answer:

Retention

If we assign 100% credibility to the actual 2019 experience to inform the assumptions for 2021, then:

- Administration should be set at 11%
- Premium taxes should be set at 2%
- Risk & Profit should be set at 7% (assuming the same target loss ratio of 80%)

SOA Commentary on Question:

Other answers are acceptable if candidates assigned partial credibility to the 2019 claim experience to arrive at higher retention factors.

Base rate increase

SOA Commentary on Question:

The answer below reflects the assumed retention factors from part (i), which targets an 80% loss ratio. Other answers are given full credit if candidates carried forward the retention factors from part (i) and performed the calculations correctly.

2019 Experience		Retention	2021 Projected Retention
Premiums	$10,000,000	-6.25%	$9,375,000
Incurred Benefit Claims	7,500,000	80%	$7,500,000
Administration	1,100,000	11%	$1,031,250
Premium Taxes	200,000	2%	$187,500
Risk and Profit	$1,200,000	7%	$656,250

The base rate will decrease by 10,000,000 – 7,500,000 / 80% = $625,000 or 6.25% in order to make the above retention schedule work out for 2021.

SOA Commentary on Question:

Other answers are acceptable if candidates used a different set of recommended retention factors and/or different expected future claims experience from part (i)

Age/gender and area factors

Age/gender factors

As can be seen from the age/gender experience table, each cohort uniformly delivered a 75% loss ratio. This implies that the experience met the factors' expectation. Thus, no change to the age/gender factors are needed for 2021.

2019 Experience: Premiums and Claims by Age/Gender			
Age/Gender	Premium	Claims	Ratio
Males under 25	$1,500,000	$1,125,000	0.75
Males 25-40	1,500,000	1,125,000	0.75
Males 40 and over	1,500,000	1,125,000	0.75
Females under 25	2,000,000	1,500,000	0.75
Females 25-40	2,000,000	1,500,000	0.75
Females 40 and over	1,500,000	1,125,000	0.75

Area factors

The 2019 in-force rate assumes a loss ratio of 80% instead of the 75% actual loss ratio.
Therefore, we are assessing each cohort's experienced loss ratio against the 75% overall actual loss ratio.

Calculate the actual loss ratio by region in 2019

Calculate the adjusted area factor that is reflective of the actual loss ratio by region in 2019

Apply 50% credibility to arrive at the blended area factor for 2021.

Region	Current Factor	2019 Experience		2019 Exp Loss Ratio	Calculation	2021 Factor
	50%	*Premium*	*Claims*	*Premium/ Claims*	50%	
NE	1.1	$2M	$1.5M	0.75	1.1*0.75/0.75=1.10	1.10
SE	0.9	$2M	$1.6M	0.80	0.9*0.8/0.75=0.96	0.93
MW	0.9	$2M	$1.5M	0.75	0.9*0.75/0.75=0.90	0.90
W	1.1	$2M	$1.4M	0.70	1.1*0.7/0.75=1.03	1.06
SW	1	$2M	$1.5M	0.75	1*0.75/0.75=1.00	1.00

2. Fall 2020 DP-A #5a-c

SOA Commentary on Question:

This question examined the candidate's understanding of considerations for administrative components of rate setting. Overall, candidates did not seem familiar with the source material that was being tested, and in general performed poorly on the question.

Part a:

Source(s): Expense Assumptions
Question: List the steps involved in revising this assumption.

SOA Commentary on Question:

As a straight-forward list retrieval question, many candidates performed well and received full credit.

SOA Answer:

1) Determine the scope of the expense study
2) Collect the expense data
3) Check the consistency of the expense data with internal and external reports
4) Determine which expenses will be excluded from the determination of the best estimate assumption for expenses
5) Determine the expense categories to be used
6) Determine the unit expense bases to be used
7) Classify expenses to the expense categories
8) Allocate expenses to the expense categories
9) Determine the unit expenses
10) Perform reasonability checks on the results

Part b:

Source(s): Expense Assumptions
Question: List the administration activities you should consider based on the business structure of Royale Health. Describe considerations for each of these activities.

SOA Commentary on Question:

Nearly all candidates struggled with both parts of (b), and did not seem familiar with the source material that was being tested. Partial credit was given to candidates who were able to provide some of the activities, with more credit given to candidates who described the considerations in a thoughtful manner for administrative assumption setting.

SOA Answer:

Premium Billing – May vary by type of bill
Commissions – unit expense measure is usually a percent of premium
Premium collection – unit expense measure is usually per bill or per policy
Anniversary activity/customer service calls – unit expenses measure is usually per policy
Coverage renewal processing – may be included in acquisition expenses if renewal date is beyond the term of liability, unit expense measure is usually per coverage

Expense studies – may be based on the same categories as the expense study, usually included in policy maintenance expense, per policy or a percent of premium.
Customer tax monitoring – unit expense measure is usually per policy
Reinsurance/stop loss administration – eligibility/benefits/dependents, unit expense measure is usually per certificate
Policyholder changes – natural unit is per change but as a proxy unit expense measure is usually per policy in force
Direct management recruiting and staff development – usually a percentage of other admin

Part c:

Source(s): Expense Assumptions
Question: Describe the categories of corporate and overhead expenses that should be considered in your expense study.

SOA Commentary on Question:

Nearly all candidates struggled with part (c), and did not seem familiar with the source material that was being tested. Partial credit was given to each category described in a thoughtful manner. The example below is an example with a wider array of descriptions accepted; no credit was given for merely listing a category.

SOA Answer:

Financial Reporting – includes all financial reporting, accounting, tax compliance and corporate actuarial and audit functions
Human Resources – provide the human resource function for the business operations included in the scope wherever performed, including payroll, benefit accounting, and staff training
Information Technology – Expenses related to operating and maintaining current IT systems are usually allocated to their supporting function. The IT expenses allocated to corporate, overhead or investment functions are included in these functional expenses if allocated to line of business, jurisdiction and product line.
Legal – legal expenses (internal and external) except those related to direct expenses
Other Corporate – other corporate expenses include all corporate expenses not described above or already allocated directly to line of business, product line or operating unit. This includes staff of senior executives, communication expenses, facility expenses, and many others.

3. Fall 2020 DP-A #7

SOA Commentary on Question:

This question required a solid understanding of the source text and most candidates seemed to have only a surface-level understanding. Candidates had the most difficulty earning significant credit on parts (b) and (c).

Part a:

Source(s): Leida 4 – Managing Antiselection

Question: Compare and contrast the Cumulative Antiselection (CAST) Model with the Minnesota Antiselection (MNAM) Model.

SOA Commentary on Question:

This question required the candidate to list both the similarities and differences between the CAST and MNAM models. Candidates who were familiar with the source text tended to do well on this part.

SOA Answer:

Compare

- Both are partition models to estimate antiselection
- Individuals are ranked by expected cost
- Models require drawing a line between healthy and unhealthy insureds

Contrast

- CAST draws the line between healthy and unhealthy by using a multiple of claims, usually between 5 and 10
- MNAM was developed to find boundary conditions on antiselection in specific situations

Part b:

Source(s): Leida 4 – Managing Antiselection

Question: Describe how the CAST model has improved over time.

SOA Commentary on Question:

Similar to part (a), candidates who were familiar with the source text tended to do well on this part.

SOA Answer:

- Problem: not a good fit in the 3-4 durations due to underwriting wear-off
  - Solution: apply additional UW factors
- Problem: not a good fit in later durations when only a fraction of the original population remains
  - Solution: choose a higher value of k2 and recalibrate the model
- Problem: not a good fit when a rate spiral is severe and volatile
  - Solution: use a projection with stronger terms/fit different curves to data
- Problem: causing of more level gross premium structure over time
  - Solution: if managed knowledgeably, helps offset initial steep slope of premiums

Part c:

Source(s): Leida 4 – Managing Antiselection

Question: Calculate the expected number of lives remaining after the rate increase. Show your work.

SOA Commentary on Question:

This question required the candidate to calculate the expected number of remaining lives using the shock lapse formula. A majority of candidates were not familiar with the shock lapse formula and appeared to make something up. Candidates who were familiar with the formula generally did well.

SOA Answer:

$$ShockLapse = \frac{RateIncrease - Trend}{(RateIncrease - Trend) + \frac{(1+Trend)}{EF}}$$

Healthy lives shock lapse = (.07-.05)/[(.07-.05)+((1+.05)/1.3)] = 2.4%
Number of healthy lives after rate increase = healthy lives * (1 – shock lapse) = 223*(1-.024) = 218

Impaired lives shock lapse = (.22-.05)/[(.22-.05)+((1+.05)/.8)] = 11.5%
Number of impaired lives after rate increase = 777*(1-.115) = 688

Total lives remaining after rate increase = 218+688 = 906

Insured Population	Number of lives	Rate Increase	Trend	Elasticity Factor	Shock Lapse	Number of lives after Rate Increase
Healthy lives	223	7.0%	5.0%	1.3	2.4%	218
Impaired lives	777	22.0%	5.0%	0.8	11.5%	688
Total lives	1,000	18.7%	5.0%	N/A	N/A	906

Part d:

Source(s): Leida 4 – Managing Antiselection

Question: Propose a rate increase scenario that minimizes lapses.

SOA Commentary on Question:

This question required the candidate to propose a new rate increase for both healthy and impaired lives and provide justification that the proposal minimizes lapses.

Most candidates who attempted this question received partial credit. Those who did well in part (c) tended to do well in this part.

SOA Answer:

Proposal

Healthy lives rate increase: 5.0% (in line with trend)

Impaired lives rate increase: 22.6% (to maintain overall rate increase)

Insured Population	Number of lives	Rate Increase	Trend	Elasticity Factor	Shock Lapse	Number of lives after Rate Increase
Healthy lives	223	5.0%	5.0%	1.3	0.0%	223
Impaired lives	777	22.6%	5.0%	0.8	11.8%	685
Total lives	1,000	18.7%	5.0%	N/A	N/A	908

Justification

Because healthy lives have a higher elasticity factor and therefore are more likely to lapse at a large rate increase, the proposal keeps all healthy lives by using a rate increase equal to trend. The impaired lives rate increase is adjusted to maintain the overall 18.7% increase, which is justified as impaired lives are less elastic. The resulting number of lives remaining is 908, higher than the 906 lives from the initial scenario.

4. Fall 2020 DP-A #9

SOA Commentary on Question:

Many candidates performed well on this question. For (b), a good answer showed the formula and calculated the solution correctly. For (c), full credit was given to candidates who both listed and described at least four credibility challenges from the source materials.

Part a:

Source(s): Issues in Applying Credibility - LTD
Question: Describe the 2012 GLTD valuation standard.

SOA Commentary on Question:

Most candidates answered the question too narrowly to receive full credit.

SOA Answer:

The 2012 GLTD standard is a Principles Based Reserve approach, blending company-specific experience using a limited fluctuation credibility model. The standard requires the LTD insurer to fully or partially reflect company specific claim termination experience.

Part b:

Source(s): Issues in Applying Credibility - LTD
Question: Calculate the number of expected terminations required for LTD claims within durations 4 to 24 months to be considered fully credible. Calculate the partial credibility factor for this experience.

SOA Commentary on Question:

Candidates who knew the formula generally scored well on this part of the question. Many received full credit.

SOA Answer:

(i) 0.05 = 1.44 * sqrt(variance factor/number of expected terminations to be fully credible)
Number of expected terminations = 4.0 * (1.44/0.05) ^ 2 =3,318

(ii) Z = sqrt(number of terminations/number of terminations to be fully credible)
Z=sqrt(250/3318) = 27.45%

Part c:

Source(s): Issues in Applying Credibility - LTD
Question: List and describe four challenges in applying credibility in LTD.

SOA Commentary on Question:

Several candidates either listed or described four challenges. Those who did both received full credit.

SOA Answer:

Regulations – states may have prescribed credibility rules that conflict with industry standards and may be more challenging to calculate or achieve full credibility

Non-Independence of claims – Since claims are somewhat dependent, it increases the threshold needed for full credibility and makes it more challenging to estimate the parameters

Outlier claims – outliers can be challenging to identify if not fully materialized and lower the credibility

Competitive pricing pressures – insurers in competitive markets sometimes have to choose between relying on the credibility formula or producing a more competitive rate to get the business.

5. Fall 2021 DP-A #1

SOA Commentary on Question:

This question tested the candidate's knowledge of the calculation and utilization of expense assumptions. Well-prepared candidates earned most of the credit on parts (a), (b) and (e). Part (c) seems to have been particularly challenging.

Part a:

Source(s): Expense Assumptions

Question: List the steps for completing an expense review.

SOA Commentary on Question:

Candidates were expected to list the steps below. Most candidates did well on this portion.

SOA Answer:

Determine the scope of the expense study;
Collect the expense data;
Check the consistency of the expense data with internal and external reports;
Determine which expenses will be excluded from the determination of the best estimate assumption for expenses;
Determine the expense categories to be used;
Determine the unit expense bases to be used;
Classify expenses to the expense categories;
Allocate expenses to the expense categories;
Determine the unit expenses; and
Perform reasonability checks on the results of the study.

Part b:

Source(s): Expense Assumptions

Question: (i) Describe the categories of expenses to consider in expense studies. (ii) Describe unit measurements that can be used for each expense category.

SOA Commentary on Question:

Candidates received points separately for describing the categories and for describing at least two measurements for each identified category.

SOA Answer:

Part (i)
Acquisition – expenses related to marketing and selling policies (to both new and existing customers)
Administration – expenses related to the insurer's operations; can include billing, collections, general management, monitoring and reporting
Benefits – expenses related to validating eligibility for and paying benefits/claims
Asset/Investment – expenses related to managing the insurer's investment portfolio
Overhead – general expenses not included elsewhere; can include executive management, actuarial, legal, HR, IT, etc.

Part (ii)

Acquisition unit measurements can include number of policies issued, number of policy applications, sales commission, certificates issued, benefit amount, payment amount, or issue premium

Administration unit measurements can include number of in-force policies, certificates in force, service commission, premium income, number of billings, number of terminations, number of riders, deposits, and face amounts

Benefits unit measurements can include number of claims, benefit amount, number of termination claims paid, policy liability, fund value

Asset unit measurements for asset expenses can include market value, acquired value, disposal value, number of policy loans, mortgage payment, and bond interest

Overhead unit measurements can include number of policies in force, certificates in force, premium income, fund value, surplus, required capital, employees, percentage of non-overhead expenses

Part c:

Source(s): Expense Assumptions

Question: Describe considerations when allocating expenses for underwriting activities.

SOA Commentary on Question:

This part focused on the unique considerations when developing underwriting expenses. A full-credit response would demonstrate understanding of the unique elements of underwriting expenses and, particularly, the distinction between policies submitted and policies placed. No credit was given to candidates who simply identified considerations in allocating or categorizing expenses.

SOA Answer:

The key considerations are:

- Was underwriting priced for in the existing product?
- Is the expense considered an acquisition expense per the Standards of Practice?
- The unit expense for underwriting is typically measured per policy issued, per policy and per thousand issued, per policy issued within premium bands.
- Expenses related to "declined" policies are usually spread over all "placed" policies.
- Expenses related to substandard ratings may be percentage of the extra premium charged or spread over all substandard policies.

Part d:

Source(s): Expense Assumptions

Question: Compare and contrast considerations for applying expenses when setting premium rates for: Individual disability insurance and Group health insurance

SOA Commentary on Question:

Candidates frequently overlooked that they were asked to provide both similarities and differences. Candidates who only provided similarities or only provided differences were given partial credit. The question specified expense considerations and not contract provisions associated with these coverages. Credit was given for additional items relevant to the topic.

SOA Answer:

Differences

Individual disability may be unitized per $100 of coverage, or per claim paid

Disability expenses are often much higher in the beginning durations, when management of the claim is intense. Durational adjustments may be considered in unit expense development.

Disability claims may have additional expense-incurring activities such as rehabilitation, evidence review, termination/ death, termination review, subrogation, litigation

Disability claims may have re-checks

Disability claim unit expenses could be the sum of expense per initial claims, expense per payment, expense per adjudication re-check, expense per $100 of claim, expense per litigated case

Group health expenses and claims may be priced separately by province or state

Group health may have unit expense measured per policy

Group health expense may be limited by the ACA

Group health may have expenses combined to avoid collecting data that is too detailed

Similarities

For both, some expenses are incurred at the organizational level, such as corporate overhead

For both, expenses can include HR, IT, Legal, and other corporate expenses

For both, allocation of expense methodologies may include transaction-based, activity-based, time study based, in force based, staff based, or allocated across product lines

For both, the expense study steps for collecting, reviewing, and categorizing data remain the same

Part e:

Source(s): Expense Assumptions

Question: Calculate the required adjustment to premium. Show your work. State your assumptions.

SOA Commentary on Question:

The ideal answer incorporated both the loss ratio and the expenses required adjustments. Multiple approaches to calculating the impact were accepted. Full credit required demonstrating how both elements were considered and providing an explanation adequate to allow an independent actuary to validate the work.

SOA Answer:

Target loss ratio: 70%

Actual loss ratio: 75%

Current expense load: 30% (sum of the administration, claim adjudication, commissions, premium taxes, risk and profit)

Proposed expense load: 30.8% (sum of the administration, claim adjudication, commissions, premium taxes, risk and profit)

Restated target loss ratio assuming the increase in expense load: 1- 30.8% = 69.2%

Required rate adjustment = 75/69.2 -1 = 8.38%

6. Fall 2021 DP-A #3

SOA Commentary on Question:

This question dealt with antiselection and measured the candidate's understanding of four different aspects of antiselection: different types, what measures in the ACA addressed antiselection (since underwriting was impacted by rules in the ACA), a short calculation showing the level of premium leakage, and finally how to address antiselection and premium leakage.

Part a:

Source(s): Leida 4 – Managing Antiselection
Question: Describe the following types of antiselection:

SOA Commentary on Question:

Most candidates did well on this part and were able to both define the type of antiselection and provide a good example of when a policyholder would, in effect, participate in that particular type of antiselection.

SOA Answer:

(i) External – The antiselection that occurs when someone is choosing to become insured. Those that are sicker or know that they have a condition are more likely to seek insurance. For example, someone who needs dental work is more likely to purchase dental insurance.

(ii) Internal – The antiselection that occurs while a policyholder is insured. When given the choice, healthy policyholders will choose to buy down to less expensive coverage, while sicker members will buy up to richer plans.

(iii) Durational – The antiselection that occurs when a policyholder is determining whether to end insurance coverage. Healthier members are more likely to lapse coverage while sicker policyholders are more likely to retain insurance coverage for the following reasons:Less willing to become uninsured; Less likely to find coverage elsewhere (less of a factor post-ACA; More emotionally attached to current insurance

Part b:

Source(s): Leida 4 – Managing Antiselection
Question: List and describe measures included in the Affordable Care Act (ACA) to control antiselection.

SOA Commentary on Question:

Almost all candidates were able to list at least some of the measures included in the Affordable Care Act used to control antiselection – many did not provide a comprehensive list though and provided only 2 or 3 examples. To receive full credit for this question, a candidate needed to both list and describe the measures. Many candidates did not receive full credit as they stopped well short of giving any kind of description of the various measures.

SOA Answer:

1. Coverage mandates and premium subsidies

a. Carrot and the stick approach to increasing participation within health insurance
b. There are group penalties for employers with over 50 full time equivalents (FTEs) not offering MEC (minimum essential coverage) to EEs (employees)
c. There is an individual mandate in which individuals are penalized for not having qualified coverage
d. Certain small group ERs (employers) are rewarded with premium tax credits for offering EEs health insurance
e. Individuals may qualify for federal subsidies on exchanges to encourage them to obtain coverage

2. Aligning rules on and off exchanges
   a. This is done because the exchanges created different types of risk and antiselection for insurers, and encourages insurers to treat both populations equally without opportunity for gaming the system
   b. Policies on and off the exchange must be in the same risk pool and have identical rates
   c. Policies on and off exchange must have identical broker and agent commissions/fees
   d. Policies on and off exchange must not use marketing practices designed to discourage unhealthy risks from signing up
   e. Policies on and off exchange must spread exchange fees across the risk pool
   f. Open enrollment periods must align for the plans
   g. Plans on the exchange must offer at least 1 gold and 1 silver plan

3. Open enrollment periods
   a. There is a designated open enrollment period each year in the individual market
   b. This means members cannot simply get coverage any time they know they are about to incur expenses limiting antiselection

4. Minimum benefit levels
   a. Qualified health insurance must be at least bronze tier level (60% actuarial value)
   b. This means people cannot go out and get "health insurance" that provides less than minimal coverage and be considered exempt from penalties which healthy risks would likely do

5. The 3 R's - Risk adjustment, risk corridors and reinsurance
   a. Risk corridors were temporary and limited the risk for the carrier
   b. Reinsurance is meant to stabilize by protecting from large claims
   c. Risk adjustment is permanent and each carrier pays or receives based on the risk of their population

Part c:

Source(s): Leida 4 – Managing Antiselection
Question: Calculate the premium leakage. Show your work. State your assumptions.

SOA Commentary on Question:

Most candidates were able to calculate the average Premium Renewal. Common mistakes were not calculating the Renewal Claims, or mistaking buydown for premium leakage.

SOA Answer:

	Distribution	Current Premium	Claims
Healthy	80%	$75.00	$100.00
Unhealthy	20%	$75.00	$200.00
Average (current)			$120.00

Premium Leakage = difference of expected claims and expected premium

	Distribution	Current Premium	Renewal Premium	Renewal Claims
Healthy	80%	$75.00	$85.50	$95.00
Unhealthy	20%	$75.00	$90.00	$200.00
Average (new)			$86.40	$116.00
Amount of Premium Leakage= $116.00 - $86.40				**$29.60**

Part d:

Source(s): Leida 4 – Managing Antiselection

Question: Develop a plan to reduce premium leakage. Justify your response.

SOA Commentary on Question:

Most candidates did not have a good understanding of how to address premium leakage. Many suggested changes to benefit structure (changing deductibles or cost sharing so the plans were more similar), or adding a load to Plan A – which would only exacerbate the problem.

SOA Answer:

Adding a selection load to Plan B would serve to decrease the premium differential between the two plans. This would help to reduce the premium leakage as some of the healthier members would lose the incentive to buy down to the leaner plan.

7. Fall 2021 DP-A #5

Part a:

Source(s): Issues in Applying Credibility - LTD

Question: Describe dynamics that make it difficult to apply credibility when pricing group long term disability (LTD) insurance.

SOA Commentary on Question:

Candidates needed to describe each dynamic to earn full credit. Candidates did very well on this part.

SOA Answer:

- •Non-independence of claims - some factors may affect multiple claims, such as management of claims or economic volatility
- •Heterogeneous claims - different claims may not follow the same patterns, even when pooled
- •Competitive pricing pressures - There is pressure to give the experience more credibility than what would be prescribed if a purely theoretical approach were taken, because it is difficult to pursue rate increases on cases that have had good experience in a competitive market environment.
- •Claim duration - claim durations can range from one year to several decades long, depending on diagnosis, definition of disability, limitations, and many other factors. On top of this, LTD claim experience tends to be more volatile in the early durations of claim. There is a strong correlation between recoveries and cause of disability in early durations of claim, resulting in recovery patterns in early durations that can vary significantly by cause of disability.
- •Benefits from other sources - Benefits from other sources are typically awarded within the first few years of claim, creating irregular payment streams in early durations.
- •Outlier claims - The reason why these types of outlier claims are challenging to work with is that the statistical probability of a claim of the same magnitude happening again could be very small, because maybe only a fraction of the group are highly paid individuals, but nonetheless these claims do happen.
- •Regulatory requirements - Some states have adopted credibility requirements as part of the supervisory process. These requirements may apply to manual rate development, for example modifying existing pricing factors, or to experience rating of LTD products. It can be a challenge for some carriers to meet the required credibility criteria.
- •Estimating parameters - Estimating the parameters of a credibility model (like confidence intervals and full credibility thresholds) is often based on a combination of subjective opinion and empirical testing. When the credibility is based on an underlying confidence interval, then the confidence factor (e.g. 85%) and allowable error (e.g. 5%) are usually determined subjectively.

Part b:

Source(s): Issues in Applying Credibility - LTD

Question: Create a table comparing the credibility level for ABC and XYZ for groups with 50, 100, 300, and 500 lives.

SOA Commentary on Question:

This part was a simple calculation and most candidates received full credit.

SOA Answer:

Lives	ABC	XYZ
50	0.00%	1.00%
100	0.00%	4.00%
300	77.46%	36.00%
500	100.00%	100.00%

Part c:

Source(s): Issues in Applying Credibility - LTD

Question: Explain reasons why ABC and XYZ may have developed different credibility curves.

SOA Commentary on Question:

Most candidates earned partial credit on this part by describing a few of the following reasons. Only explaining one or two differences received partial credit. Describing the credibility curves rather than explaining reasons why the two companies may have developed different credibility standards did not receive any credit.

SOA Answer:

•ABC may have greater confidence in its manual rates, especially for smaller cases
•Management and/or corporate philosophies could prefer the selected approach
•Recent experience between companies could lead to different confidence in experience/manual rates
•Competitive pressures to increase experience credibility
•Underlying benefit design or benefit offset differences
•Experience may have more closely compared to manual data, resulting in higher confidence in manual rates than group experience
•Regional differences - variations in population or migration patterns
•Demographic differences or targets could lead to different utilization patterns
•Differences between industries/occupations lead to different experience patterns
•Regulatory requirements impacting what is or is not allowed

Part d:

Source(s): Issues in Applying Credibility - LTD

Question: Describe reasons actual claims may deviate from: (i) The insurer's manual rates. (ii) The group's prior experience claims.

SOA Commentary on Question:

The responses for sub-parts (i) and (ii) overlapped quite a bit. Because of this, most candidates were able to identify a few reasons such as demographic and external factors and receive at least partial credit. Credit was given if an answer was provided in either or both parts. For full credit, a candidate needed to describe at least four reasons total with at least one coming from (i) and (ii).

SOA Answer:

(i) Deviation from manual rates:
Manual rates are based on pooled experience which isn't necessarily reflective of a single group
Underwriting selection wear-off

Inaccurate manual rating factors
Distribution system - association groups vs single employer
Changes in the demographic mix of employees over time can alter disability experience trends
External factors like economic recessions can impact the experience
Changes in underwriting or claim management practices can shift the experience
Higher volatility in smaller groups
Changes in legislation
Outlier claims

(ii) Deviation from prior experience:
Durational change - change in definition
Administration system changes - claim processing speed, fraud, waste, etc.
Changes in plan design may result in different claims experience
Changes in the demographic mix of employees over time can alter disability experience trends
External factors like economic recessions can impact the experience
Changes in underwriting or claim management practices can shift the experience
Higher volatility in smaller groups
Changes in legislation
Outlier claims

Part e:

Source(s): Issues in Applying Credibility - LTD
Question: Recommend adjustments to the credibility formulas used by ABC and XYZ. Justify your response.

SOA Commentary on Question:
Candidates did fairly well on this part. At least two adjustments with justification were needed for full credit. Credit was given for most recommendations if they were properly justified.

SOA Answer:
Both ABC and XYZ need to increase their threshold for full credibility as 500 lives is not enough. LTD needs a lot of lives to be fully credible, since it occurs over long durations, is sensitive to economic cycles, and claims are not independent. 500 lives should not produce 100% credibility.

ABC should remove the 250 life minimum for credibility, as a single additional life (250 versus 249) can increase the credibility from 0% to 71%. Providing credibility to smaller groups will also mitigate adverse selection in the market place where groups are seeking the most competitive rates for their employees.

8. Spring 2021 DP-A #1

SOA Commentary on Question:

This question evaluated candidates' understanding of the unique issues associated with credibility and the application of the 2012 GLTD valuation standard to address volatility within Group Long-Term Disability Insurance. Candidates generally did well on this question.

Part a:

Source(s): Issues in Applying Credibility - LTD

Question: Explain how each of the following complicate the application of traditional credibility models to Long Term Disability (LTD) Coverage: Non-independence of claims, Heterogeneous risk classes, and Claim duration

SOA Commentary on Question:

For part A, candidates needed to explain how each item complicated credibility, and what specific characteristics of LTD coverage created the complexity to earn full credit.

SOA Answer:

Non-Independence of Claims - LTD exposures, which are often measured in terms of claims, are not believed to be completely independent despite this assumption in most credibility models. For instance, external factors such as work conditions or the state of the economy can affect many if not all of the members of a group, and these factors are correlated with disability incidence.

Heterogeneous Risk Classes - The underlying assumption is that claims experience will emerge similarly as it had in the past. There are a number of reasons why this assumption may not be true: Changes in the demo mix of employees, external factors like economic recessions, changes in underwriting or claim management practices, changes in plan design.

Claim Duration - LTD claim durations can range from one year to several decades long, depending on diagnosis, definition of disability, limitations and many other factors. This in and of itself creates challenges with applying credibility in LTD. On top of this, LTD claim experience tends to be more volatile in the early durations of claims due to reasons of changing definitions from own occupation to any occupation, other revenue sources, limits on mental health diagnoses, and early durations being dominated by recoveries versus death.

Part b:

Source(s): Issues in Applying Credibility - LTD

Question: Calculate the Credibility Adjusted Reserve for Policy A. Show your work.

SOA Commentary on Question:

For part B, while partial credit was given for correct steps and knowledge of formulas/process, many candidates calculated the correct reserve and earned full credit.

SOA Answer:

1. Assign given variance factors to each durational year

2. Calculate the expected number of terms needed for full credibility for each year: =Variance Factor*(1.44/0.05)^2
3. Calculate the Credibility Factor for each year: = min(100%, (Expected number of Claim Terms/Needed Number of Claim Terms)^0.5)
4. Calculate the needed reserve for each year: = Cred Factor*Comp Experience + (1-Cred Factor)*Manual Rate
5. Sum for a total reserve: $501,310

Duration Year	Expected Claim Terminations	Policy A Experience Rate	Manual Rate	Variance Factor (1)	Expected Claim Terminations for Full Credibility (2)	Credibility (3)	Reserve (4)
1	3,450	$50,000	$45,000	4.0	3,318	100%	$50,000
2	3,500	$52,500	$45,200	4.0	3,318	100%	$52,500
3	2,750	$52,500	$49,900	3.0	2,488	100%	$52,500
4	2,250	$55,000	$42,900	3.0	2,488	95%	$54,406
5	1,750	$35,000	$34,000	3.0	2,488	84%	$34,839
6	1,500	$35,000	$33,300	2.5	2,074	85%	$34,746
7	1,250	$35,000	$32,600	2.5	2,074	78%	$34,463
8	1,000	$35,000	$31,500	2.5	2,074	69%	$33,931
9	850	$30,000	$30,100	2.5	2,074	64%	$30,036
10	800	$27,500	$25,200	2.5	2,074	62%	$26,629
11	750	$22,500	$24,300	2.0	1,659	67%	$23,090
12	650	$20,000	$23,400	2.0	1,659	63%	$21,272
13	600	$17,500	$23,100	2.0	1,659	60%	$19,732
14	550	$15,000	$20,600	2.0	1,659	58%	$17,376
15	500	$12,500	$19,800	2.0	1,659	55%	$15,792

(5) Total Reserve **$501,310**

Part c:

Source(s): Issues in Applying Credibility - LTD

Question: Explain the risks associated with reserve setting if credibility is not properly considered.

SOA Commentary on Question:

For part C, candidates who earned full credit demonstrated an understanding of the downstream risks of applying too much/too little credibility to experience and commented on the impacts of both over and underfunding a reserve. Credit was also given for other valid explanations of risks/impacts.

SOA Answer:

An incorrect application of credibility creates a risk that the reserve is over/under funded, both of which will have consequences for rate setting. An under application of credibility on experience will result in too high of premiums for a favorable group which in turn may choose to seek coverage

elsewhere, and too low of premiums for unfavorable groups which will stay leading to insufficient reserves and a potential death spiral.

9. Spring 2021 DP-A #7

Part a:

Source(s): GH101-137-20 – Short Term Disability
Question: Explain how short term disability (STD) claims may trend due to utilization.

SOA Commentary on Question:

Few candidates explained that STD claims trend is tied more to the employer's wage inflation or population mix, rather than the frequency of disabling events.

SOA Answer:

STD claims are on-inflation type products since they are typically calculated as a percentage of salary and increase as salary increases. Generally, STD rates do not necessarily trend due to cost inflation. Employers' disability premiums increase over time because of their own wage inflation, even though disability rates (i.e., frequency of disabling events) may not change.

The frequency of claims (utilization) will change over time with economic conditions and the employer's financial condition.

Part b:

Source(s): GH101-137-20 – Short Term Disability
Question: Calculate the renewal rate change for MNO. Show your work.

SOA Commentary on Question:

Candidates generally did well identifying MNO's current rating factors but had more difficulty recommending changes to the rating factors based on 2019 experience. Some candidates correctly calculated the product of the renewal rating factors applied to MNO's renewal but did not divide out the product of MNO's current rating factors, which resulted in a renewal increase percentage that was ~12% too high.

The model solution gives 100% credibility to Insurer X's experience. Full credit was also given if candidates assumed different credibility levels.

SOA Answer:

The incurred loss ratio is 75%, which is higher than the target loss ratio of 70%. To achieve the target loss ratio, a base rate increase of 7.14% = 75% / 70% – 1 is needed. However, the problem states that the base rates will not be changed.

I assume that Insurer X will not revise its base rate. Therefore, I am normalizing the loss ratios for each rating factor to reach the incurred loss ratio of 75%. I am assuming Insurer X's experience has 100% credibility.

Age/Gender	Current Factor	Incurred Loss Ratio	Revised Factor
Males under 25	0.50	75%	**0.50** = 0.50 × (75% / 75%)
Males 25-40	0.75	75%	**0.75** = 0.75 × (75% / 75%)
Females 40+	1.25	75%	**1.25** = 1.25 × (75% / 75%)

No change to age/gender factors. Average age/gender for 7-employee census provided is 0.7857.

Industry	Current Factor	Incurred Loss Ratio	Revised Factor
Construction and manufacturing	1.5	110%	**2.2** = 1.5 × (110% / 75%)

Group Size	Current Factor	Incurred Loss Ratio	Revised Factor
5-9	1.10	90%	**1.32** = 1.1 × (90% / 75%)

Area	Current Factor	Incurred Loss Ratio	Revised Factor
Northeast	1.15	75%	**1.15** = 1.15 × (75% / 75%)

MNO has a 60% employer subsidy and employee participation of 77.7% = 7/9

Employer Subsidy	Employee Participation	Current Factor	Incurred Loss Ratio	Revised Factor
50-100%	50-100%	0.75	75.83%	**0.7583** = 0.75 × (75.83% / 75%)

MNO's renewal increase
= Product of revised factors / Product of current factors – 1
= (0.7857 × 2.2 × 1.32 × 1.15 × 0.7583)
/ (0.7857 × 1.5 × 1.10 × 1.15 × 0.75) – 1
= **78%**

Part c:

Source(s): GH101-137-20 – Short Term Disability
Question: Propose changes, if any, to the pricing factors to be applied to MNO's next policy renewal. Justify your response.

SOA Commentary on Question:
Some candidates did not recognize that the 2021 claims experience provided was for employer MNO, rather than all of Insurer X's STD block. Recommendations to change Insurer X's rating factors based solely on one year of MNO's 7-life experience did not receive full credit.

SOA Answer:
I recommend making no changes to the base rates and factors. This sample size is too small to achieve true credibility and would lead to a dramatic over-reaction to one year of claims. Rather, the credibility formula should be adjusted to only consider manual rates for a group this small, rather than assigning partial credibility to MNO's experience.

10. Spring 2021 DP-C #3

Part a:

Source(s): Eaton chapter 10 (2nd ed.) – LTCI Premium Rate Increases
Question: Calculate for policy numbers 9 and 10 using a 5-year projection period, the: (i) Present value of future earned premium (ii) Present value of future incurred claims (iii) Loss ratio.

SOA Commentary on Question:

This question tested candidates' understanding of LTC assumptions and projection methods. Full credit was given for correctly developing persistency and interest factors, applying them to premiums and claims, and calculating the loss ratios. Partial credit was given for correctly calculating the various components of the calculation of PV premium and PV claims. Many candidates did well on this question, but few received full credit due to calculation errors at various stages.

SOA Answer:

See the Excel file for the detailed answer

Additional Assumptions

- Lapses and deaths occur prior to premium and claims. All occur at mid-year.

Part b:

Source(s): Various ASOP's
Question: Identify Actuarial Standards of Practice to be considered when projecting and communicating the loss ratio to Thunderball management.

Commentary on Question:

Candidates only needed to list the applicable ASOPs. Full credit was given for listing ASOP 18, ASOP 41, and at least one other applicable ASOP. Many candidates provided descriptions of various ASOPs, in addition to listing them. Generally, candidates did well on this part.

SOA Answer:

ASOP 18: Long-Term Care Insurance
ASOP 23: Data Quality
ASOP 25: Credibility Procedures
ASOP 41: Actuarial Communication

Part c:

Source(s): Eaton chapter 10 (2nd ed.) – LTCI Premium Rate Increases
Question: Describe steps that should be taken to evaluate the financial condition of Thunderball's LTC business.

SOA Commentary on Question:

This part tested candidates' ability to synthesize material from multiple sources covering repricing and general best practices. Many candidates noted reviewing assumptions or evaluating loss ratios.

SOA Answer:

Summarize historical experience, including policy counts, earned premium, and incurred claims.
Analyze historical experience to evaluate assumptions. Morbidity, lapse, and mortality assumptions should be reviewed to confirm they are still appropriate and adjusted if needed.
Prepare lifetime projections of the business by combining historical experience with projected future experience.
Compare projected lifetime experience, including loss ratios, to pricing expectation and regulatory requirements.

Part d:

Source(s): Eaton chapter 10 (2nd ed.) – LTCI Premium Rate Increases
Question: Evaluate Thunderball's assertion. Justify your response.

SOA Commentary on Question:

This part tested candidates' understanding of the interaction between LTC premium and claim levels over the life of a policy. Full credit was given if candidates stated an evaluation and provided an appropriate justification. Many candidates described the rate increase justification required as part of the 58/85 test in Rate Stability regulation, for which full credit was also given.

SOA Answer:

Thunderball's management is incorrect. It is not appropriate to compare a projected future loss ratio with a pricing lifetime loss ratio for LTC business. LTC policies are priced with level premiums, but claims are lower at younger ages and higher at older ages. In early durations, excess premiums are collected and used to prefund claims in later durations.

Part e:

Source(s): Eaton chapter 4 (2nd ed.) – Hybrid Life and LTC Products
Question: (i) Compare and contrast the premium and benefit structures of: stand-alone LTC products and the LTC portion of life and LTC combination products. (ii) Describe characteristics of LTC combination products that incentivize a consumer to purchase a combination product over a stand-alone LTC product.

SOA Commentary on Question:

Part (i) tested candidates' understanding of the LTC benefit and premium structures of both stand-alone and combination products. Candidates were expected to provide both similarities and differences. Many candidates provided only differences. Full credit was given if at least one similarity and one difference were described for both premium and claims. Many candidates commented on the premium for the LTC portion of the combo product being lower than the premium for standalone LTC, but did not include commentary on the premium structure.

Part (ii) tested candidates' understanding of the history of stand-alone policies and the development of combination products. Full credit was given for candidates who identified at least two incentives for consumers to purchase a combination product. Many candidates correctly noted the "use it or lose it" nature of stand-alone LTC products.

SOA Answer:

(i) Premiums. Premiums for stand-alone LTC policies are generally guaranteed renewable and priced to be level. As long as the policyholder pays the premium, the policy cannot be cancelled. However, there have been a lot of rate increases in the past. In combo policies, the premiums for LTC benefits can be an explicit additional premium (explicit premium method), they could be included as a charge in the discounting of an accelerated benefit (actuarial present value method), or they could be funded with a lien against the policy (lien method). Many combination products are sold as single-premium policies, which avoids rate increases for the consumer.

Benefits. Benefits for stand-alone policies can be indemnity or reimbursement and defined as either a time period or a pool of money. Benefit eligibility is generally based on ADL deficiencies or cognitive impairment and payments are made after the elimination period. LTC benefits for combination policies can also be indemnity or reimbursement and are usually defined as a pool of money. The LTC benefits may be an acceleration of the death benefit or an extension of additional benefits beyond the death benefit. Benefit eligibility triggers are often more diverse than for stand-alone LTC and could include terminal illness as a qualifying event.

(ii) Stand-alone LTC policies have a history of rate increases, even though they were priced as level premium products. The rate guarantees of combination products generally do not allow for rate increases and many are sold as single premium policies. This eliminates the possibility of a rate increase.

Stand-alone LTC policies also have a "use it or lose it" nature in that consumers can pay premiums for years and receive nothing in return if they do not receive qualifying LTC services. Combination policies pay a benefit upon death or the need for LTC services, so consumers receive a benefit no matter what.

Consumers may also need both life/annuity coverage and LTC coverage. Combination products can meet both of these needs in a single policy.

11. Fall 2020 DP-C #1

Part a:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: List and describe factors that impact Medicare Supplement pricing.

SOA Commentary on Question:

Eight items with descriptions were required for full credit. Additional items beyond the list below were given credit if they related to Medicare Supplement products.

SOA Answer:

1. Morbidity - Industry studies can be a good source for developing expected claims.
2. Mortality - Not a significant assumption, included with persistency as a single decrement.
3. Persistency (lapsation) - Should be based on the company's experience for similar products.
4. Investment Earnings - Can be credited to the claim reserve
5. Selection Factors/ Underwriting - can be used to modify the claim costs for the first one to three years.
6. Age/Sex Distribution - It is preferable to use the company's own experience if available
7. Smoker/Non-smoker consideration - An adjustment to the claim costs for the insured population that will be smokers. Smokers have higher claims than non-smokers.
8. Area Factors - Claim costs vary by geographic area, generally by 3-digit zip codes or by county.
9. Expenses & Taxes - Includes acquisition and maintenance expenses, and premium and income tax

Part b:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Describe the different loss ratio standards which must be met as part of a Medicare Supplement annual filing.

SOA Commentary on Question:

No credit was given if the loss ratio standards were listed without a description. Full credit required the candidate to describe the loss ratios, and how each relates to the applicable loss ratio standard.

SOA Answer:

1. Lifetime Loss Ratio - The accumulated value of past plus present value of future claims, divided by the accumulated value of past plus present value of future premium, must meet or exceed the applicable loss ratio standard.
2. Future Loss Ratio - The present value of future claims, divided by the present value of future premium, must meet or exceed the applicable loss ratio standard.
3. The expected third year loss ratio must meet or exceed the applicable standard.

The applicable standard is either the company's original expected loss ratio, or the statutory minimum, whichever is greater.

Part c:

Source(s): CP321-101-25 – Pricing Med. Supp.

Question: Explain how insurers are prevented from recouping past Medicare Supplement losses.

SOA Commentary on Question:

Candidates who did well explained the specific mechanism that prevented recouping of losses: the future loss ratio standard.

SOA Answer:

The loss ratio standards, specifically the future loss ratio, prevent a company that has had poor experience from recouping losses. Increasing premiums to offset poor prior experience will result in the future loss ratio being too low.

Part d:

Source(s): CP321-101-25 – Pricing Med. Supp.

Question: Assess whether or not a $2,400 annual premium satisfies the 65% loss ratio requirement for each of the loss ratio standards. Show your work.

SOA Commentary on Question:

Candidates generally did poorly on this part. Full credit required the candidates to show their work. Common issues with this exercise were a misapplication of the survivor counts, lapse or mortality rates; applying the smoker or sex factor to the premium; and a failure to weight policy years by survivors.

SOA Answer:

Policy Year	Adjusted Claim Cost	Incurred Claim Cost	Premium Income	years of discount	PV Future Claims	PV Future Premium	Loss Ratio
1	$1,671.50	$1,671,504	$2,400,000	0	$1,631,221	$2,400,000	67.97%
2	$1,728.54	$1,279,120	$1,776,000	1	$1,188,850	$1,691,429	70.29%
3	$1,773.72	$993,285	$1,344,000	2	$879,226	$1,219,048	72.12%
		$3,949,902	$5,520,000		$3,699,297	$5,310,476	69.66%

- Adjusted Claim Cost = Unadjusted Claim Cost * Sex Adj * Smoker Adj
- Incurred Claims = Adjusted Claim Cost * Survivors
- Premium Income = $2,400 * Survivors
- PV Future Premium = The present value, at time of issue, of all premium income, using a 5% discount factor.
- Example Policy Year 2 = $1,691,429 = $1,776,000 * (1/1.05)^1
- PV Future Claims = The present value, at time of issue, of all premium income, using a 5% discount factor.

- Example Policy Year 2 = $879,226 = $993,285 * (1/1.05)^1.5
- Loss Ratio #1 = Loss Ratio #2 (since these are rating assumptions, assume no actual/past experience has been observed) = PV Future Claims / PV Future Premium = 69.7%)
  Loss Ratio #3 = 73.9% (Incurred Claim Cost in Year 3 / Premium Income in Year 3, no PV)
- All loss ratios exceed 65% with a $2,400 annual premium. This premium satisfies the 65% requirement.

12. Fall 2021 DP-C #3

Part a:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Describe pricing methodologies for Medicare Supplement plans and explain reasons why each would be selected.

SOA Commentary on Question:
Candidates generally received full or no credit on this part.

SOA Answer:

Community rated programs: All participants will pay the same rate and experience the same rate increase.
Issue-age pricing: The rate an individual pays will be based upon his/her age at first issue, and will be the same as others issued at that same age.
Attained-age methodologies: The rate will be based on the individual's current age, regardless of how long coverage has been in force.

Selection of a pricing methodology needs to consider regulatory requirements and competitive considerations. The insurer would also need to consider the member experience and the extent of underwriting.

Part b:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: (i) Describe policy standardization requirements reflected in the National Association of Insurance Commissioners (NAIC) Medicare Supplement Model Regulation. (ii) Describe the purpose of this regulation.

SOA Commentary on Question:
Candidates generally performed poorly and did not describe the policy standardization requirements, instead describing the NAIC Model regulation in general.

SOA Answer:

(i) A company is allowed to only have one policy form per plan type, for each of individual non-Select, group non-Select, individual Select, and group Select, unless subsequent policy forms have one or more of the following differences: inclusion of innovative benefits, marketing method (e.g., direct marketed vs. agent sold), underwriting method (e.g., fully underwritten vs. guaranteed issue), or eligibility for Medicare aged vs. Medicare disabled.
The regulation requires that any decision to discontinue availability of a policy form must be communicated to the insurance commissioner. The company who discontinued that form is then prohibited from filing another form of that same type and plan for a period of 5 years.

(ii) The purpose of this restriction is to prevent a company from closing one block of poorly-performing business, beginning sale of a new form, and then taking large rate increases on the older block.

Part c:

Source(s): CP321-101-25 – Pricing Med. Supp.

Question: Calculate the annual premium for an 80-year-old policy holder. Show your work.

SOA Commentary on Question:

Most candidates made errors at various steps of the calculation and received partial credit. Adj. Claim Cost = (Unadjusted Claim Cost) x (1 + Sex Factor Adj.) x (1 + Smoker/Non-Smoker Adj.)

Policy Year	Att. Age	Unadjusted Claim Cost	Sex Factor Adj.	Smoker/Non-smoker Adj.	Adj. Claim Cost
1	80	1,644.73	7.7%	-3.00%	1,718.23
2	81	1,707.43	8.0%	-3.00%	1,788.70
3	82	1,726.77	8.2%	-3.00%	1,812.31
4	83	1,745.30	8.4%	-3.00%	1,835.15
5	84	1,801.06	8.6%	-3.00%	1,897.27
6	85	1,819.93	8.9%	-3.00%	1,922.45
7	86	1,839.58	9.1%	-3.00%	1,946.77
8	87	1,859.29	9.3%	-3.00%	1,971.24
9	88	1,879.49	9.6%	-3.00%	1,998.12
10	89	1,899.91	9.6%	-3.00%	2,019.83
11	90	1,921.29	9.6%	-3.00%	2,042.56
12	91	1,942.91	9.6%	-3.00%	2,065.55
13	92	1,965.11	9.6%	-3.00%	2,089.15
14	93	1,987.33	9.6%	-3.00%	2,112.77
15	94	2,010.48	9.6%	-3.00%	2,137.38
16	95	2,034.17	9.6%	-3.00%	2,162.57

Survivors, Policy Year 1 = 1000

Survivors, Policy Years 2+ = (Survivors previous year) x (1 – Mortality Previous Year/1000) x (1 – Lapse Rate Previous Year)

Incurred Claims = (Adj. Claim Cost) x (Survivors)

PV Incurred Claims = (Incurred Claims) / (1 + Discount) ^ (Policy Year – 0.5)

PV Premium = 1 / (1 + Discount) ^ (Policy Year – 1)

Policy Year	Attained Age	Mortality	Lapse Rate	Survivors	Incurred Claims	PV Incurred Claims	PV Premium
1	80	95.00	20%	1,000.00	1,718,233	1,676,824	1.000
2	81	104.37	15%	724.00	1,295,021	1,203,630	0.952
3	82	114.94	15%	551.17	998,894	884,192	0.907
4	83	126.66	15%	414.65	760,937	641,485	0.864
5	84	139.30	15%	307.81	583,996	468,876	0.823
6	85	152.57	10%	225.19	432,917	331,027	0.784
7	86	166.30	10%	171.75	334,358	243,490	0.746
8	87	180.28	10%	128.87	254,032	176,185	0.711
9	88	195.82	10%	95.07	189,968	125,479	0.677
10	89	214.77	10%	68.81	138,985	87,432	0.645
11	90	240.12	10%	48.63	99,327	59,509	0.614
12	91	279.05	10%	33.26	68,693	39,196	0.585
13	92	349.97	8%	21.58	45,081	24,498	0.557
14	93	470.08	8%	12.90	27,265	14,111	0.530
15	94	670.00	8%	6.29	13,447	6,628	0.505
16	95	1,000.00	8%	1.91	4,131	1,939	0.481

Total Incurred Claims = ∑ PV Incurred Claims = 5,984,500
Premium Factor = Sumproduct(PV Premium , Survivors) = 3,378
Premium PMPY = 5,984,500 / 65% / 3,378 = **$2,725.54**

Part d:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Calculate the expected profit margin over the lifetime of the policy. Show your work.

SOA Commentary on Question:

Most candidates received partial credit making errors at various stages of the calculation while very few received full credit.

SOA Answer:

Premium Income = Premium PMPY x Survivors
Commissions = Premium x Broker Commissions
Admin Expenses = Premium x Admin and Tax Load
Gain from Ops = Premium Income – Incurred Claims – Commissions – Admin Expenses
PV Profits = (Gain from Ops) / (1 + Discount) ^ (Policy Year)

Policy Year	Attd. Age	Premium Income	Incurred Claims	Commissions	Admin Expenses	Gain from Ops	PV Profits
1	80	2,725,536	1,718,233	545,107	408,830	53,365	50,824
2	81	1,973,288	1,295,021	197,329	295,993	184,944	167,750
3	82	1,502,235	998,894	150,224	225,335	127,782	110,383
4	83	1,130,133	760,937	113,013	169,520	86,663	71,298
5	84	838,942	583,996	83,894	125,841	45,211	35,424
6	85	613,766	432,917	61,377	92,065	27,407	20,451
7	86	468,111	334,358	46,811	70,217	16,725	11,886
8	87	351,238	254,032	35,124	52,686	9,396	6,360
9	88	259,125	189,968	25,913	38,869	4,376	2,821
10	89	187,545	138,985	18,754	28,132	1,673	1,027
11	90	132,539	99,327	-	19,881	13,331	7,794
12	91	90,643	68,693	-	13,596	8,353	4,651
13	92	58,814	45,081	-	8,822	4,910	2,604
14	93	35,172	27,265	-	5,276	2,632	1,329
15	94	17,147	13,447	-	2,572	1,128	543
16	95	5,206	4,131	-	781	294	135

Profit Margin = ∑PV profits / (∑PV Incurred Claims / 0.65) = 495,280 / 9,206,922 = **5.4%**

13. Fall 2021 DP-C #4a-c,e

SOA Commentary on Question:

Generally, candidates did not receive full credit for this question. Most candidates demonstrated general knowledge about disability products but struggled to synthesize the information to address the specific scenarios in each sub-part. Many candidates used the correct formula to calculate the manual premium in part (e), though few produced the correct values for all factors in the manual premium formula.

Part a:

Source(s): Skwire 12 – Group Disability Benefits

Question: Describe ways a group long term disability (LTD) insurer mitigates: (i) Moral hazard and (ii) Financial risks

SOA Commentary on Question:

Many candidates did well on this part, though there tended to be overlap between items that could fit under either (i) or (ii). Candidates who provided appropriate responses in either box received credit.

SOA Answer:

(i) LTD insureds are somewhat incentivized not to recover. Mitigation strategies include:

- Limiting the maximum benefit amount insureds can receive to less than pre-disability income.
- Changing to more restrictive definitions of disability (from any occupation to own occupation) and loss-of-income requirements (from 20% to 40%) after a set period of time (usually 2 years)
- Offsetting benefits for Social Security disability payments, worker's compensation payments, and post-disability income

(ii) Financial risks can be managed by:

- Limiting claim durations for mental health claims (due to difficulty of assessing ongoing disability), typically 2-year benefit limit
- Fraud review
- Settlements, although the insurer should make sure the insured has legal representation to avoid the appearance of taking advantage of the insured
- Managing disabilities and providing rehabilitative support and encouragement to return to work

Part b:

Source(s): Skwire 12 – Group Disability Benefits

Question: Evaluate the advantages and disadvantages to an insurer of offering both short term disability and LTD with respect to: Financial risk and Claims management

SOA Commentary on Question:

Some candidates incorrectly provided responses from the employer, rather than insurer, perspective. Candidates needed to provide responses from the insurer perspective to earn credit.

SOA Answer:

Advantages: Able to administer complex claims from the start (more info, more claim management). Insurer may be able to manage claims during the STD period and prevent them from developing into LTD.

Disadvantages: Presence of STD makes it easier for employees to remain out of work during the LTD elimination period, and increases the chance of a member having LTD claims. Greater financial risk in total

Part c:

Source(s): Skwire 25 – Disability Claim Costs

Question: Describe considerations for developing LTD interest rate assumptions.

SOA Commentary on Question:

Many candidates responded with explanations of why the interest rate assumption is important, instead of considerations for an insurer when selecting the interest rate assumption.

SOA Answer:

The interest rate needs to be in line with Thunderball's expected returns on the assets backing its active life and disabled life reserves. The interest rate assumption should be based on the types of investments used.

In addition, Thunderball should ensure that the durations of its assets are appropriately matched to those of its liabilities. Duration matching is a technique that can be used in investment management to mitigate risk, and the selection of appropriate bond/equity assets to cover the predicted losses will ultimately determine the interest rate that the account earns.

Part e:

Source(s): Skwire 25 – Disability Claim Costs

Question: Calculate the monthly net manual premium per employee for the client. Show your work.

SOA Commentary on Question:

Many candidates provided the correct framework for the calculation, even if they did not use the correct factors in deriving the net premium. Most candidates correctly calculated the discount rate, though only some calculated the correct continuance rates by year. Candidates were awarded partial credit if they provided the correct formula, even if the factors used were incorrect.

$$(IncidenceRate) \times \sum_{\substack{Benefit \\ Period}} Benefit_t \times Continuance_t \times InterestDiscount_t.$$

SOA Answer:

From Exhibit 1:

Incidence Rate for males under 30, with 6-month elimination period

= 0.5 per 1,000 lives

= 0.0005

t	B_t	p_t	$c_t = c_{t-1} \times (1 - p_t)$	$v_t = (1+5\%)^{-t}$	$B_t \times c_t \times v_t$
Year	Benefit	Death / Recovery Rate	Continuance	Interest Discount	Product
1	50,000	0.360	0.640	0.952	30,476
2	50,000	0.340	0.422	0.907	19,156
3	50,000	0.190	0.342	0.864	14,778
4	50,000	0.120	0.301	0.823	12,385
5	50,000	0.080	0.277	0.784	10,852
				Total =	87,648

Death/Recovery Rate comes from Exhibit 2, with age at disablement of 27

Monthly net manual premium = (0.0005 × 87,648) / 12
= **$3.65 PMPM**

14. Fall 2022 DP #2

SOA Commentary on Question:

The question was attempting to test the student's knowledge of techniques for managing anti-selection risk. Building on this, the question asks for specific tools used in the underwriting process. The numerical component requires the student to take multiple inputs and derive the specific cost for anti-selection, the "buydown effect".

Part a:

Source(s): Leida 4 – Managing Antiselection
Question: Describe ways insurers manage anti-selection.

SOA Commentary on Question:

The graders were looking for the student's understanding of reasonable tools to manage anti-selection. The student was expected to provide 4 tools for full credit.

SOA Answer:

Valid responses included:

- Individual (medical) underwriting before issue
- Policy provisions that exclude or limit coverage due to pre-existing conditions
- Implement minimum participation percentage
- Increase the size of the risk pool
- Add waiting periods
- Limit changes between plans
- Add anti-selection premium
- Limit changes to specific time windows
- Institute enrollment periods

Part b:

Source(s): Leida 4 – Managing Antiselection
Question: Insurer M wants to reduce expenses for performing routine underwriting tasks. (i) Identify four types of underwriting tools that would best serve Insurer M's needs. (ii) Identify four types of underwriting tools that would not address Insurer M's needs.

SOA Commentary on Question:

This portion of the question was looking for a demonstration of knowledge of underwriting tools and the relative costs of these tools. Candidates who provided logical support for their choice of tool received full credit. The student was expected to provide 8 tools for full credit.

SOA Answer:

Valid underwriting tools included:
Individual application

- Health questionnaires
- Attending physician statements (APS)
- Internal data – relevant claims or application data

- Tax returns
- Pre-existing provisions
- Commercial databases – an example are prescription databases
- Telephone interviews
- Inspection reports – obtained through direct contact with the applicant or their family
- Lab testing – blood, saliva, or urine testing
- Medical exams
- Automated underwriting tools

Part c:

Source(s): Leida 4 – Managing Antiselection

Question: Calculate the amount of premium leakage that occurs in 2021. Show your work.

Additional Commentary on Question:

This part of the question required the student to solve for the 2020 incurred claims and then parse these claims into high and low risk claims. From there, the 2021 claims for both plans and the premium leakage can be calculated. The example below shows the premium leakage for the entire block, but we also accepted the premium leakage for an average policy.

SOA Answer:

This example calculates the buydown effect for the entire block.

Step	Formula	Result
2020 average incurred claims	9000 (average premium) x 0.9 (loss ratio)	8,100
Solve for average high risk claims, where H = high risk claims and L = low risk claims. We are given that L= H x 0.9	8100 x 1200 (total claims) = 700H + 500L = 700H + 450H	H = 8,452.17 L = 7,606.96
2021 Plan A high and low risk claims	2020 high/low risk claims x (1+trend). Trend given as 0.	H = 8,452.17 L = 7,606.96
2021 Plan B high risk claims	Plan A high risk claims x (1- high-risk benefit buydown)	6,761.74
2021 Plan B low risk claims	Plan A low risk claims x (1-low-risk benefit buydown)	7,226.61
Weighted average 2021 claims		7,874.61
Weighted average 2021 premium	Weighted average 2021 claims/0.9	8,749.56
Premium leakage	The short fall of premium due to premiums decreasing more than claims = "the expected pure premium if a random sample of the population migrated to the leaner plan minus the actual pure premium that results from internal antiselection" = 1,200 (number of members) x (8,749.56 - 8,000)	899,475

Part d:

Source(s): Leida 4 – Managing Antiselection

Question: Evaluate the effectiveness that different ACA-prohibited techniques would have at addressing premium leakage.

SOA Commentary on Question:

The student was expected to provide an example of ACA-prohibited techniques along with a rationale on how it addressed premium leakage. Many of the responses included only ACA allowed techniques. Full credit was given for four techniques that included explanations on how they addressed premium leakage.

SOA Answer:

Typical ACA prohibited techniques would include using health status in rating formulas, using initial underwriting to decide on the coverage level to provide, using pre-existing condition exclusions, using marketing practices to discourage unhealthy members to enroll, and using recissions (outside of where fraud or misrepresentation of material fact can be proven). Mechanisms which deny coverage would be ineffective here since the population is the same from one year to the next with no lapse. If health risk status were allowed, or underwriting, this could have an impact on reducing the premium leakage seen as the plan premiums would more closely match the expected claims experience.

15. Fall 2022 DP #6

SOA Commentary on Question:

This question was testing knowledge Long Term Care (LTC) insurance. Candidates needed to know about LTC pricing assumptions, rate increase requirements, and shock lapses.

Part a:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Explain how variances from the following pricing assumptions may result in the need for a rate increase on a block of long term care (LTC) policies: (i) Morbidity, (ii) Persistency, (iii) Interest.

SOA Commentary on Question:

Most candidates provided enough to get partial grading points, but few wrote sufficient detail to receive full points on part a.

SOA Answer:

(i) Morbidity.

- To maintain a consistent lifetime loss ratio, additional premiums are needed to cover increases in claims.
- LTC policies are issue age rated.
- Due to the difference in the average issue age and the average age at claim and the impact of underwriting selection, differences in morbidity may not be evident for several years. This makes it important to increase premiums as soon as this issue is identified.

(ii) Persistency.

- LTC rates are intended to remain level and policies may persist for 50 years or more.
- Because claims are much higher at old ages than young ages, more policies persisting results in more policies reaching older ages where claims are much higher than premiums.
- LTC is lapse-supported and a portion of the premium for policies that terminate in early durations is used to help pay for claims on persisting policies in later durations. Higher persistency rates result in less premium from terminated policies being available to help pay for claims on persisting policies.

(iii) Interest.

- Part of the excess premium collected in early years of an LTC policy, when premiums are higher than claims, is used to build up a reserve to fund future claims.
- This pre-funding is partially dependent on interest to grow over time.
- If interest rates are lower than expected, then the reserves will grow more slowly and may not be large enough to fund future claims at older ages.

Part b:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Assess whether the block needs a rate increase. Justify your response.

SOA Commentary on Question:

Many candidates correctly identified that a rate increase was needed due to persistency being different than expected. Candidates needed to provide justification to receive full credit.

SOA Answer:

Yes, a rate increase is justified due to the difference in actual and expected persistency.

- Many more policies than originally expected are still in force after 10 years, which means persistency is higher than expected.
- LTC is lapse-supported, so premiums paid by policies that terminate without a claim are partially used to cover claims for policies that persist.
- Higher persistency will result in more policies reaching older attained ages, where claims are higher than premiums, resulting in higher-than-expected lifetime loss ratios.

Part c:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Calculate the maximum rate increase permitted under the 2014 NAIC LTC Model Regulations. Show your work.

SOA Commentary on Question:

Candidates generally did poorly on this calculation. Few candidates provided and used the formula correct.

SOA Answer:

Test: $C \geq (\max(58\%, \text{pricing LR}) * D) + (85\% * E) + (\max(58\%, \text{pricing LR}) * F) + (85\% * G)$

PV Historical Incurred	69,500,000	A
PV Future Incurred	558,500,000	B
PV Total Incurred	628,000,000	C = A + B
PV Historical Original Earned	384,500,000	D
PV Historical Rate Increase	23,000,000	E
PV Future Original Earned	263,000,000	F
PV Future Rate Increase	52,500,000	G
Pricing LR	63%	H
Additional PV Future Rate Increase	183,411,765	I = C - [(63% * D) + (85% * E) + (63% * F) + (85% * G)] / 85%
Premium Necessary		
Justified Rate Increase	58%	J = I / (F + G)

Part d:

Source(s): Eaton 9 – LTCI Experience Monitoring

Question: (i) Describe the impact of shock lapses from a rate increase. (ii) Explain the impact shock lapses have on projected future experience.

SOA Commentary on Question:

Candidates generally had high level description of shock lapse but did not provide sufficient detail for full credit. Candidates struggled to connect shock lapses to LTC.

SOA Answer:

(i) Large rate increases have the potential to result in shock lapse and antiselection. Shock lapse occurs when policyholders reevaluate their need for a policy when required to pay the higher premium cost. It is expected that policies who decide to pay the increased premium expect to use benefits and have worse health, on average, than those who shock lapse. After the shock lapse, the average morbidity of the remaining policies is slightly higher than before the shock lapse because the healthier policies were more likely to shock lapse.

(ii) As a result of shock lapse, we should expect a small decrease in persistency when the rate increase is implemented. This will result in decreases to both future premiums and future claims compared to a projection without any shock lapse. As a result of antiselection, we should expect slightly higher average incurred claims. This will result in slightly higher future claims, although this is an offsetting impact to the decrease in future claims as a result of the shock lapse.

16. Fall 2022 DP #13

Part a:

Source(s): Skwire 25 – Disability Claim Costs
Question: List and describe the steps of the disability claim process.

SOA Commentary on Question:

Some candidates described the steps from a member's perspective, which missed steps from a carrier's perspective.

SOA Answer:

1. Eligibility for coverage: Class of employees eligible for coverage, is the plan in force? Meet actively at work requirements?
2. Disability determination: Compare disabling limitations with physical requirements of job.
3. Payment Calculation: Pre-disability income x benefit % limited to maximum, less offsets. Pre-disability income is based on plan's earning definition.
4. Offsets: Directly reduce the group disability liability, such as STD or Social Security.
5. Ongoing proof of disability: STD benefits approved for specific time. LTD benefits reevaluated minimum of once per year. Any changes in claimants medical condition or treatment typically triggers and a re-evaluation.

Part b:

Source(s): Skwire 25 – Disability Claim Costs
Question: Describe tools used in the disability claim process to reduce risk for the insurer.

SOA Commentary on Question:

Some candidates provided plan and benefit design considerations rather than tools that reduce risk after the claim process has started.

SOA Answer:

1. Medical review: attending physician statements, independent medical exams, function capacity exemptions.
2. Rehabilitation plans: vocational rehabilitation, which provides training for new career or geared towards re-gaining some specific physical limitation.
3. Financial evaluation: involves verification of both pre-disability and current earnings. Also helpful for proposing settlements for managing claims.
4. Fraud review: review of documentation submitted with claims, including inconsistencies in the information, alterations to previously provided info, etc.

Part c:

Source(s): Skwire 25 – Disability Claim Costs
Question: Describe the two significant reserves in disability income insurance.

SOA Commentary on Question:

Partial credit was awarded if candidates used incorrect reserve names with accurate descriptions.

SOA Answer:

1. Active life reserve. Excess premium set aside to offset the greater morbidity at the older ages when the premium will be inadequate. Include interest earnings.
2. Disabled life reserve. Reflects each disability claim and its projected length.

Part d:

Source(s): Skwire 25 – Disability Claim Costs

Question: Describe risks and considerations when reviewing group long term disability insurance industry morbidity data.

SOA Commentary on Question:

Many candidates failed to discuss insurance industry data but rather discussed general underwriting principals.

SOA Answer:

1. Lack of substantial and reliable data.
2. Reliability and updated morbidity tables based on sex, occupation class, benefit period, elimination period and size of indemnity are required by actuary for pricing.
3. Overutilized of industry studies by carriers.
4. Size of the studies and the effort required to conduct data are so great they are done infrequently and do not serve well to track recent claim trend.
5. Impact of economic cycle on claim studies (during good economic times, claims experience and profits will be more favorable than during poor economic times).
6. Few industry studies tend to lose credibility and value as they attempt to break down the data into smaller cells.
7. ASOP 23 and selection of data, whether it's appropriate, sufficient and any limitations.

Part e:

Source(s): Skwire 25 – Disability Claim Costs

Question: Evaluate the experience for Years 3 - 7 using: (i) Calendar year loss ratio study, (ii) Incurral year loss ratio study, (iii) Actual-to-expected claim incident rate study. Show your work.

SOA Commentary on Question:

Candidate performance varied and partial credit was awarded when applicable.

SOA Answer:

Calendar Year	CY LR = (Paid Claims + Change in Reserves for all Incurral Years Combined) / Earned Premium	IY LR = (PV Claims to Date + PV Current Claim Reserve) / Earned Premium	Rated Incident Rate (from Exhibit 1)	Actual-to-Expected Claim Incident = Actual Incident Rate / Rated Incident Rate
Year 3	57.6%	76.6%	2.1	0.52
Year 4	79.6%	76.5%	2.1	1.10
Year 5	96.4%	77.8%	2.1	1.33
Year 6	69.2%	76.1%	2.1	1.62
Year 7	77.1%	77.6%	2.1	1.71

Part f:

Source(s): Skwire 25 – Disability Claim Costs

Question: Recommend one of the study approaches from part (e) to share with management. Justify your response.

SOA Commentary on Question:

Points were awarded for recommending other study approaches with adequate justification.

SOA Answer:

I recommend using the incurred year loss ratio. While this won't correspond to financial statements, it does provide a better historical trend by attributing the full cost of a claim to the year in which the claim occurred.

Part g:

Source(s): Skwire 25 – Disability Claim Costs

Question: Thunderball management is concerned about the emerging experience compared to the incident rate pricing assumptions. The CEO recommends using the latest Canadian LTD study instead of company experience for rate development. Critique the CEO's recommendation. Justify your response.

SOA Commentary on Question:

Some candidates simply agreed with the CEO recommendation without adequate critique. Full credit was awarded when candidates provided well thought out critique and justification.

SOA Answer:

Thunderball is a company operates in the United States and Canada. The CIA study will only include Canadian experience. There are differences between US and Canadian experience, such as Canadian plans cannot use the cause of disability to differentiate between plan provisions. There are differences in workforce demographics and other workplace factors.

Given the length of time for claims disability experience to emerge, I would not switch to different underlying study based on different experience after five years.
I'd recommend adjusting the current experience for economic cycle and other factors that may be in underlying data before switching to an entire new study.

17. Fall 2023 DP #1

SOA Commentary on Question:

Candidates generally did well on this question. Successful candidates demonstrated an understanding of LTC industry experience and the expected relationships between the various assumptions.

Part a:

Source(s): Eaton 2 – History of LTC Products

Question: Describe the evolution of long-term care (LTC) products.

SOA Commentary on Question:

This question asked candidates to describe, rather than list, the changes in the product over time. Successful candidates were able to describe at least 4 changes that have occurred over time within the LTC product design. Partial credit was given to candidates who were able to accurately describe at least one change in the product design.

SOA Answer:

- Home Health Care benefit restrictions were removed and Assisted Living Facility benefits were added.
- Benefit payments were revised from indemnity only to also include reimbursement and disability-style payments.
- Benefit pools were expanded to include unlimited payments.
- Benefit triggers were adjusted from medical necessity to be based on ADL or cognitive deficiencies.
- Issue age ranges were widened.
- Additional benefits were offered, including inflation protection, return of premium, shared care, restoration of benefits, survivorship, and limited pay.

Part b:

Source(s): ASOP #18, 23, 25, 41

Question: List the Actuarial Standards of Practice an actuary should consider when performing an LTC experience study.

SOA Commentary on Question:

This question asked candidates to list applicable ASOPs. Successful candidates were able to identify the appropriate ASOP by name and number, although credit was also given to candidates who listed the correct ASOP number along with a description of the ASOP. Partial credit was given to candidates who listed some, but not all, of the applicable ASOPs. Some candidates provided general commentary on best practices, rather than referencing any ASOPs, for which no credit was given.

SOA Answer:

- ASOP 18: Long-Term Care Insurance
- ASOP 23: Data Quality
- ASOP 25: Credibility Procedures
- ASOP 41: Actuarial Communications

Part c:

Source(s): Eaton 9 – LTCI Experience Monitoring

Question: Calculate for each calendar year the experience-based: (i) Voluntary lapse rate. (ii) Active mortality rate, (iii) Disabled mortality rate, (iv) Claim incidence rate. Show your work.

SOA Commentary on Question:

Candidates generally did well on this question. Successful candidates were able to calculate the rates for each calendar year using the appropriate formulas. For part (i), credit was given for calculating lapse rates with either total exposure (active exposure + disabled exposure) or active exposure only.

SOA Answer:

- Voluntary Lapse Rate = Voluntary Lapse Count / (Active Exposure + Disabled Exposure
- Active Mortality Rate = Active Death Count / Active Exposure
- Disabled Mortality Rate = Disabled Death Count / Disabled Exposure
- Claim Incidence Rate = New Claims Count / Active Exposure

Calendar Year	Total Exposure	Lapse Count	Lapse Rate
2018	14,918	149	1.00%
2019	14,010	154	1.10%
2020	13,121	131	1.00%
2021	12,295	111	0.90%
2022	11,513	138	1.20%

Calendar Year	Active Exposure	Active Death Count	Active Mortality Rate
2018	12,479	674	5.40%
2019	11,011	639	5.80%
2020	9,670	571	5.90%
2021	8,450	541	6.40%
2022	7,336	477	6.50%

Calendar Year	Disabled Exposure	Disabled Death Count	Disabled Mortality Rate
2018	2,439	85	3.49%
2019	2,999	96	3.20%
2020	3,451	124	3.59%
2021	3,845	131	3.41%
2022	4,177	155	3.71%

Calendar Year	Active Exposure	New Claims Count	Claim Incidence Rate
2018	12,479	649	5.20%
2019	11,011	551	5.00%
2020	9,670	522	5.40%
2021	8,450	465	5.50%
2022	7,336	425	5.79%

Part d:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Evaluate whether the experience-based voluntary lapse and mortality rates are reasonable compared to LTC industry experience. Justify your response.

SOA Commentary on Question:

Successful candidates provided an assessment of the reasonableness of the historical experience, along with a justification supporting their assessment. To receive full credit, candidates needed to provide both assessments and justifications for both voluntary lapse and mortality.

SOA Answer:

The lapse experience is reasonable. The industry has seen lapse rates close to 1% and the total lapse rates in the experience are very close to that level.

The mortality experience is not reasonable. Active mortality rates are almost twice as high as disabled mortality rates. Because disabled insureds are less healthy, on average, the disabled mortality rates should be higher than the active mortality rates.

Part e:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Recommend a lapse assumption for LMN to use in projecting the 2023 experience for their LTC block. Justify your response.

SOA Commentary on Question:

Successful candidates provided a numerical assumption, along with an appropriate justification, rather than only describing how an assumption could be developed. Partial credit was given to candidates who provided a reasonable numerical assumption based on the lapse rates they calculated in part (c).

SOA Answer:

I recommend using a lapse rate of 1.0%. This is very close to the lapse rate seen in the historical data across all calendar years combined, when calculated based on total exposures. Also, it is consistent with general industry experience that has seen ultimate lapse rates between 1% and 2%.

18. Fall 2023 DP #9

Part a:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: List and describe types of Medicare Supplement reserves.

SOA Commentary on Question:

Candidates generally performed well on this part of the question. The question asks for a list and description of the types of Medicare Supplement reserves. Candidates that only provided a list without a description received partial credit.

SOA Answer:

1. Claim Reserves – an estimate of the liability for claims incurred but not yet reported / paid as of the valuation date.
2. Active Life Reserves – reserves for non-cancellable or guaranteed renewable policies where there is pre-funding of the premiums in the early years of the policies. All standard Medicare Supplement policies are guaranteed renewable.
3. Premium Deficiency Reserves: A reserve to account for inadequate premiums to cover the cost of claims. Premium adequacy should be tested to determine the need for premium deficiency reserves. If premiums are inadequate, premium deficiency reserves should be established and rate increases should be sought when possible.

Part b:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Calculate the annual premium for an 80 year-old non-smoker male. State your assumptions. Show your work.

SOA Commentary on Question:

Few candidates received full credit for this question. Most candidates received partial credit for correctly performing parts of the calculations – calculating the decrease in the covered population to reflect the mortality rate / lapse rate, calculating the present value of the claims cost, calculating the adjusted claims cost to reflect gender and non-smoker status, and accounting for the desired 65% loss ratio.

SOA Answer:

The calculation can be broken down into the following seven steps – there are alternative calculation methods to arrive at the correct answer.

Step 1. Calculate the membership to reflect mortality and lapse rate
Step 2. Calculate the adjusted claim cost to account for gender and non-smoker status
Step 3. Multiply adjusted claims cost by membership
Step 4. Calculate present value of claims cost
Step 5. Calculate required premium using desired loss ratio
Step 6. Calculate PV of premium
Step 7. Calculate the required premium

Policy Year	Attained Age	Mortality Rate per 1000	Plan Lapse Rate	Unadjusted Claim Cost	Gender Factor Adjustment for Male	Non-Smoker Adjustment Factor
1	80	56.24	23.0%	1,809	7.7%	-2.9%
2	81	62.36	20.0%	1,833	8.0%	-2.9%
3	82	69.23	20.0%	1,856	8.2%	-2.9%
4	83	76.88	20.0%	1,878	8.4%	-2.9%
5	84	85.45	20.0%	1,899	8.6%	-2.9%
6	85	95.06	15.0%	1,920	8.9%	-2.9%
7	86	105.83	15.0%	1,940	9.1%	-2.9%
8	87	117.84	15.0%	1,961	9.3%	-2.9%
9	88	131.14	15.0%	1,981	9.6%	-2.9%
10	89	145.75	15.0%	2,002	9.6%	-2.9%
11	90	161.68	12.0%	2,024	9.6%	-2.9%
12	91	178.91	12.0%	2,045	9.6%	-2.9%
13	92	197.41	12.0%	2,067	9.6%	-2.9%
14	93	217.15	12.0%	2,090	9.6%	-2.9%
15	94	238.08	12.0%	2,113	9.6%	-2.9%
16	95	258.82	9.0%	2,137	9.6%	-2.9%
17	96	278.97	9.0%	2,162	9.6%	-2.9%
18	97	298.09	9.0%	2,186	9.6%	-2.9%
19	98	315.76	9.0%	2,212	9.6%	-2.9%
20	99	1000.00	9.0%	2,238	9.6%	-2.9%

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Membership	**Adjusted Claims Cost**	**Total Claims Cost**	**PV of Total Claims Cost**	**Required Premium**	**Premium Unit**	**Premium**
1,000.00	$1,892	$1,891,793	$1,846,200		1,000.00	
726.70	$1,922	$1,396,880	$1,298,300		692.09	
545.10	$1,950	$1,062,929	$940,873		494.43	
405.90	$1,977	$802,339	$676,387		350.63	
299.75	$2,003	$600,253	$481,928		246.61	
219.31	$2,030	$445,251	$340,458		171.83	
168.69	$2,055	$346,689	$252,470		125.88	
128.21	$2,081	$266,840	$185,068		91.12	
96.14	$2,108	$202,682	$133,877		65.07	
71.00	$2,131	$151,274	$95,163		45.77	
51.56	$2,154	$111,049	$66,531		31.65	
38.03	$2,176	$82,773	$47,230		22.24	
27.48	$2,200	$60,453	$32,851		15.30	
19.41	$2,224	$43,172	$22,343		10.29	
13.37	$2,249	$30,069	$14,821		6.75	
8.97	$2,274	$20,390	$9,571		4.31	
6.05	$2,301	$13,913	$6,220		2.77	
3.97	$2,326	$9,230	$3,930		1.73	
2.53	$2,354	$5,966	$2,419		1.05	
1.58	$2,382	$3,758	$1,451		0.62	
3,833.75	**$42,789**	**$7,547,703**	**$6,458,094**	**$9,935,529**	**3,380.15**	**$2,939.37**

Step 1: 726.70 = 1,000 x (1 – 56.24/1,000) * (1 – 23.0%)
545.10 = 726.70 x (1 – 62.36/1,000) * (1 – 20.0%)
Calculations for subsequent cells follow a similar approach.

Step 2: $1,892 = $1,809 * (1 + 7.7%) * (1 – 2.9%)
$1,922 = $1,833 * (1 + 8.0%) * (1 – 2.9%)
Calculations for subsequent cells follow a similar approach.

Step 3: Multiply the membership (from Step 1) with the adjusted claim cost (from Step 2)

Step 4: $1,846,200 = $1,891,793 / (1.05)^0.5
$1,298,300 = $1,396,880 / (1.05)^1.5
Calculations for subsequent cells follow a similar approach – discount for an additional year for subsequent cell.

Step 5: Sum up the PV of the Total Claims Cost and divide by the desired loss ratio of 65%

$9,935,529 = $6,458,095 / 65%

Step 6: 1,000 = 1,000 (no discounting needed)
692.09 = 726.70 / 1.05
494.43 = 545.10 / 1.05^2
Calculations for subsequent cells follow a similar approach – discount for an additional year for subsequent cell.

Step 7: The premium is calculated by dividing the answer from Step 5 by the answer from Step 6

$2,939.37 = $9,935,529 / 3,380.15

Part c:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: (i) Interpret the impact of the revised experience study on the future expected life-time loss ratio projections. (ii) Assess the impact of the revised experience study on the different types of reserves

SOA Commentary on Question:

(i) Most candidates performed well on this part of the question and received full credit. Candidates that only observed how the lapse rate and the claims cost emerged and how that compares to the original pricing assumption without commenting on the impact to the expected life-time loss ratio projections received partial credit.
(ii) Most candidates received partial credit for this part of the question – candidates noted the need to increase the claim reserves and the active life reserves. Few candidates noted the need to increase the premium deficiency reserves.

SOA Answer:

(i) The revised experience study shows the lapse rate is lower than the original pricing assumption. The premiums will not increase; therefore, this will increase claims cost and the expected life-time loss ratio in later policy years.

The revised experience study shows the projected claims (after accounting for trend) are much higher than the original pricing assumption. This will increase overall claims cost and increase the expected life-time loss ratio.

(ii) Claim Reserves – the revised experience study shows the claim cost coming in higher. This will require an increase to the claim reserves.

Active Life Reserves – the lapse rate emerged lower than the original pricing assumption. This will require an increase to the active life reserves.

Premium Deficiency Reserves – the policy is an issue-age policy with no rate increase in subsequent years. The observed increase in claim cost and lower lapse from the revised experience study increases the likelihood that future premiums will not be sufficient to cover future claim cost. Therefore, this will require an increase to the premium deficiency reserves.

19. Spring 2022 DP #1b-c

Part b:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Explain how the following contribute to a LTC rate increase (i) Age-rating structure (ii) Renewal provisions (iii) Low loss ratios in early durations (iv) Assumption updates between original pricing and current experience

SOA Commentary on Question:

Most candidates received partial credit on part (b) as some candidates provided descriptions of the items rather than explanations of how each contributes to a rate increase. Credit was given for reasonable answers not included below.

SOA Answer:

(i) LTC is typically issue-age rated. This means that loss ratios tend to start low and rise dramatically. This pre-funding creates a disconnect between the timing of claims and premium, which means that there is often very little premium left (due to lapses) when problems are uncovered. To address worsening claims, the little amount of premium remaining must be increased substantially.

(ii) LTC is required to be guaranteed renewable. This means that if experience worsens, the carrier is required to carry the risk moving forward. In doing so, carriers will seek out rate increases to address the rising costs.

(iii) While evaluating the need for a rate increase based on historical loss ratios may be appropriate for medical insurance, this method does not capture the pre-funding component of LTC premiums. Contract reserves are established as a regulatory requirement to capture the portion of premiums designated to fund future claims. Because the contract reserves represent a liability, by capturing the change in contract reserves in the numerator of the loss ratio calculation, the historical loss ratios increase significantly.

(iv) LTC is sensitive to the following assumptions:

a. Lapse – LTC is very sensitive to lapse rates, which have proved substantially worse compared to when most LTC was originally priced. It has become evident that policyholders understand the value of LTC insurance and as a result are lapsing at a much lower rate than originally anticipated.

b. Interest/investment earnings – Investment earnings have been low, particularly since the Great Recession.

c. Morbidity – Morbidity assumptions have generally worsened, particularly at the older ages. Over the past decade, we have seen the morbidity curve steepen, with the claim costs at younger ages decreasing and those at older ages increasing.

Part c:

Source(s): Eaton 10 – LTCI Rate Increases

Question: (i) Propose two product design changes assuming product design regulations are loosened. (ii) Explain how the changes will support the regulator's objectives.

SOA Commentary on Question:

Candidates generally did well on part (c). Credit was given for reasonable answers not included below.

SOA Answer:

(i) I propose the following changes:

a. Use attained-age rating.
b. Incorporate provisions that vary the inflation of benefits with investment returns, similar to a life policy with variable returns.

(ii) The changes above will support the regulator's objectives in the following ways:

a. Using attained-age rating causes premiums to increase alongside claims, meaning that the leveraging of claims over premium would be reduced. In this way, a 10% increase in claims could be fully mitigated with about a 10% increase in premiums.
b. By varying inflation in benefits with investment returns, the premiums will be less sensitive to variability in investment performance – which should reduce the need for unanticipated rate increases.

20. Spring 2022 DP #3a-c,e

SOA Commentary on Question:

This question assessed the candidate's knowledge of pricing techniques, including normalization of trends, application of expense ratios, and key elements of ACA and Medicare Supplement products.

Part a:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Describe Medicare Supplement pricing methods.

SOA Commentary on Question:

This question tested candidates' knowledge of Medicare supplement pricing methods. Most candidates were able to describe most of these items in sufficient detail to earn credit. Some candidates failed to differentiate between community rating and modified community rating.

SOA Answer:

Issue Age: Priced for a target loss ratio or target rate of return over the lifetime of the policy; the rate an individual pays will be based upon his/her age at first issue

Attained Age: Priced to be self-sustaining at each age; rate will be based on the individual's current age, regardless of how long coverage has been in force

Community Rated: Regardless of characteristics of the member, everyone gets charged the same premium; rate increases periodically, usually annually

Modified Community Rated: Employs a limited number of variations that may be based on age, duration, or other parameters

Part b:

Source(s): CP321-101-25 – Pricing Med. Supp.
Question: Compare and contrast plan design restrictions for: Affordable Care Act (ACA) individual major medical and Medicare Supplement

SOA Commentary on Question:

This question required candidates to synthesize commonalities and differences in regulations on plan design for ACA and Medicare supplement products. Most candidates were able to describe general similarities and differences between products, however these were frequently focused on differences in premium rating approaches, eligibility, rate review, or underwriting and not plan design restrictions.

SOA Answer:

Compare:

- Laws and regulations require both products to become more standardized to make it easier for consumers to compare insurance plans and prices.
- Both are allowed to continue blocks of business that were in force prior to laws being passed, which have benefits that are not standardized today.

Contrast:

- ACA plans must include 10 essential health benefits. Each state has its own benchmark plan listing exact services that must be covered. ACA plans must meet certain average actuarial values.
- Medicare supplemental plans are entirely standardized across 10 plans at the federal level. Medicare pays as primary.

Part c:

Source(s): Skwire 35 – Medical Claim Cost Trend

Question: Calculate the annualized claims trend for the Medicare Supplement experience from Year 2 to Year 4. Show your work.

SOA Commentary on Question:

Candidates generally did well with the core trend calculation methodology. Candidates struggled most with adjustments to normalize for changes in gender and area mix, either neglecting to apply an adjustment or applying the adjustment incorrectly. Some candidates failed to normalize for changes in membership, but otherwise calculated trends appropriately. Partial credit was given in either case.

SOA Answer:

Year	Claims per policy	Area Factor	Gender Factor	Claim Per policy adjusted for Area /Gender	Annual Trend	Two Year trend
Year 2	945	1.0041	1.0050	936.63		
Year 3	1,005	1.0042	1.0039	997.01	6.4%	
Year 4	1,062	1.0050	1.0038	1,052.29	5.5%	5.995%

Formulas to use:

- Claims per policy = Incurred Claims / Policy Count
- Area Factor = SumProduct(Area Factor x Members) / Sum(Members), calculated for each year
- Gender Factor = SumProduct(Gender Factor x Members) / Sum(Members), calculated for each year
- Adjusted Claims per policy = Claims per policy / [Area Factor * Gender Factor]
- Annual Trend = (Year 3 Adjusted Claims / Year 2 Adjusted Claims) – 1
- Annualized Trend from Year 2 to Year 4 =
  Sqrt (Year 4 Adjusted Claims / Year 2 Adjusted Claims) – 1

Part e:

Source(s): CP321-101-25 – Pricing Med. Supp.

Question: Calculate the Year 6 rate increase. State your assumptions. Show your work.

SOA Commentary on Question:

Most candidates did well on this section and demonstrated an understanding of how to calculate the rate increase. Full credit was given when assumptions were stated if the assumptions were reasonable. Several candidates calculated rate increases as if year 5 premiums were being calculated, while others used normalized claims instead of actual claims without a justification for the change from year 4 enrollment. Some candidates applied the target expense ratio incorrectly. Partial credit was given in these cases.

SOA Answer:

Year 4 Premium Per Policy	$	1,425	= Year 4 premium / Policy count
Year 4 Claims Per Policy	$	1,062	= Year 4 claims / Policy count
Trend - 6% for 2 years		1.12349	= (1.06)^2
Year 6 Projected Claims	$	1,193	= 1062 x 1.12349
Target LR (1 - expense and profit)		75%	
Required Premium	$	1,590	= 1193/0.75
Required Rate Increase		11.6%	= 1590 / 1425 – 1

Trend is assumed to be 6% per year based on the result from part c.

21. Spring 2022 DP #8

Part a:

Source(s): Leida 4 – Managing Antiselection
Question: Define:(i) Antiselection acuity (ii) Involuntary lapse rate (iii) Lapse elasticity and (iv) Partition models

SOA Commentary on Question:

Candidate performance on part (a) was mixed. Most candidates were able to define lapse elasticity and partition models, but few candidates were able to define antiselection acuity and the involuntary lapse rate.

SOA Answer:

(i) The insured's ability to predict their own claims. This varies by size of claim; high cost claims are on average more predictable than low cost claims.
(ii) The underlying probability of lapsing that is constant across all risk classes. These are thought of as random life circumstances that force a lapse, such as accidental death, which is independent of health status.
(iii) The ability and willingness of the insured population to take action after a rate increase. It varies based on health status (example: higher elasticity for healthy lives and lower elasticity for unhealthy lives).
(iv) A forecast technique in which the population is separated into subsets based on perceived health status (example: active vs. impaired).

Part b:

Source(s): Leida 4 – Managing Antiselection
Question: Compare and contrast deterministic and stochastic antiselection models.

SOA Commentary on Question:

Candidates who performed well were able to state common characteristics between the models, as well as valid contrasts. Those who performed poorly simply stated facts about each model without contrasting them.

SOA Answer:

Common characteristics (Compare):
Both are used by actuaries to model policyholder behavior.
Both use past history, define it in detail, and project into the future.

Differing characteristics (Contrast):
Deterministic models are based on mean expected values and do not provide the distributions of potential values. Stochastic models provide the full distributions of potential values and attempt to distinguish between purely random statistical fluctuation and the risk of choosing wrong assumptions.

Deterministic models are much simpler in their approach and can be reasonably accurate without advanced computing power. Stochastic modeling is complex and requires advanced computing power.

Part c:

Source(s): Leida 4 – Managing Antiselection

Question: State the formula for defining lapses in the Cumulative Antiselection Theory (CAST) model.

SOA Commentary on Question:

Candidates struggled to state the formula for defining lapses in the CAST model. Credit was also given for those who stated the shock lapse formula, since it is also used in CAST models.

SOA Answer:

${}_iq_{[x]+t} = k_1({}_aq_{[x]+t} - u) + u$

or simply stated:

"the probability of lapse for an unhealthy life = k1 parameter * (probability of lapse for healthy life – involuntary lapse rate) + involuntary lapse rate"

Part d:

Source(s): Leida 4 – Managing Antiselection

Question: Calculate the gross premium per member per year (PMPY) by applying the CAST model. Show your work.

SOA Commentary on Question:

Candidates were unable to apply the CAST model and performed poorly on part (d). Partial credit was given for correct partitions of lives and correctly trended costs.

SOA Answer:

Column	A	B	C	D	E	F	G	H	I	J	K	L
Duration	# of Healthy Lives	# of Unhealthy Lives	Avg. Cost for Healthy Lives	Actual Claims	$q^{(ai)}_t$	${}_aq_t$	$q^{(ai)}_t$	${}_aq_t$	Avg. Cost for Unhealthy Lives	${}_iq_t$	k1	u
0	10,000	0	95.00	900,000	0.100	0.20				-		
1	7,000	1,000	95.50	1,200,000	0.090	0.15			531.50	-		
2	5,320	1,630	96.30	1,300,000			0.03	0.15	483.24	0.060	0.10	0.05
3	4,362	1,692	98.23	1,303,278			0.03	0.10	517.07	0.055	0.10	0.05
4	3,795	1,730	100.19	1,337,189			0.03	0.09	553.26	0.054	0.10	0.05
5	3,340	1,750	102.19	1,377,348			0.03	0.09	591.99	0.054	0.10	0.05
6	2,939	1,756	104.24	1,418,525					633.43			

COLUMN A (Healthy Lives)
= Healthy Lives in Prior Duration * (1 – Transition Rate – Healthy Lapse Rate)
Transition Rate = Column G (Given)
Healthy Lapse Rate = Column H (Given)
Duration 3 = 5,320 * (1-0.03-0.15) = 4,362
Duration 4 = 4,362 * (1-0.03-0.10) = 3,795
Duration 5 = 3,795 * (1-0.03-0.09) = 3,340
Duration 6 = 3,340 * (1-0.03-0.09) = 2,939

COLUMN B (Unhealthy Lives)
= Healthy Lives in Prior Duration * Transition Rate + Unhealthy Lives in Prior Duration * (1 - Unhealthy Lapse Rate)
Duration 3 = 5,320 * 0.03 + 1,630 * (1-0.060) = 1,692
Duration 4 = 4,362 * 0.03 + 1,692 * (1-0.055) = 1,730
Duration 5 = 3,795 * 0.03 + 1,730 * (1-0.054) = 1,750
Duration 6 = 3,340 * 0.03 + 1,750 * (1-0.054) = 1,756

COLUMN C (Avg. Cost for Healthy Lives)
= (1+ Healthy Trend) * Prior Duration Avg. Cost for Healthy Lives
Duration 3 = 96.30 * 1.02 = 98.23
Duration 4 = 98.23 * 1.02 = 100.19
Duration 5 = 100.19 * 1.02 = 102.19
Duration 6 = 102.19 * 1.02 = 104.24

COLUMN D (Total Claims)
= Healthy Lives * Healthy Avg. Cost + Unhealthy Lives * Unhealthy Avg. Cost
= Column A * Column C + Column B * Column I
Duration 3 = 98.23 *4,362 + 517.07 * 1,692 = 1,303,278
Duration 4 = 100.19 * 3,795 + 553.26 * 1,730 = 1,337,189
Duration 5 = 102.19 * 3,340 + 591.99 * 1,750 = 1,377,348
Duration 6 = 104.24 * 2,939 + 633.43 * 1,756 = 1,418,525

COLUMNS E, F, G, H, K, and L are given.

COLUMN I (Avg. Cost for Unhealthy Lives)
Duration 1 = (1,200,000 – 95.50*7,000)/1,000 = 531.50
Duration 2 = (1,300,000 – 96.30*5,320)/1,630 = 483.24
Duration 3 = 483.24 * 1.07 = 517.07
Duration 4 = 517.07 * 1.07 = 553.26
Duration 5 = 553.26 * 1.07 = 591.99
Duration 6 = 591.99 * 1.07 = 633.43

COLUMN J (Lapse Rate for Unhealthy Lives)
${}_{i}q_{[x]+t} = k_1({}_{a}q_{[x]+t} - u) + u$
= COLUMN K * (COLUMN H – COLUMN L) + COLUMN L
Duration 2 = 0.1*(0.15-0.05)+0.05 = 0.060

Duration 3 = 0.1*(0.10-0.05)+0.05 = 0.055
Duration 4 = 0.1*(0.09-0.05)+0.05 = 0.054
Duration 5 = 0.1*(0.09-0.05)+0.05 = 0.054

Gross Premium Per Member Per Year
= Claims / Lives / Loss Ratio
= Sum of Column D / Sum of Columns A & B / 0.70
= 8,836,341 / 46,314 / 0.70
= 272.56

Part e:

Source(s): Leida 4 – Managing Antiselection
Question: Critique Lucky 7's CAST model assumptions and propose revisions to the assumptions. Justify your response.

SOA Commentary on Question:
Candidates performed poorly on part (e). Many simply stated opinions about Lucky 7's assumptions without proposing revisions or justifying their recommendations. Candidates needed to propose revisions and justify their responses with valid critiques in order to receive full credit.

SOA Answer:
It is important to calibrate the CAST model based on actual experience. Since we have three years of actual experience, I recommend changing two model assumptions to align closer to experience:

The claims trend assumption for healthy members (2%) is much higher than experience so far (less than 1% trend in the first two years). The claims trend assumption for unhealthy members (7%) is also much higher than experience so far. I recommend lowering the claims trend assumption for each risk class by 1%. This is closer to actual experience and would allow Lucky 7's rates to be more competitive and potentially lower lapse rates.

The assumed probability of a healthy life becoming unhealthy (3%) is much lower than the first two years of experience (9-10%). I recommend increasing this assumption slightly, from 3% to 5%, to align closer to actual experience and help protect Lucky 7 from underestimating claims.

22. Spring 2022 DP #10

SOA Commentary on Question:

This model solution provides an example of a response that would receive full credit – this is not necessarily the only solution. When appropriate, partial credit is given for minor calculation errors.

Part a:

Source(s): Skwire 25 – Disability Claim Costs; Issues in Applying Credibility - LTD
Question: Describe: (i) Factors used to analyze LTD experience. (ii) Ways to estimate the credibility of experience used to develop LTD manual rates.

SOA Commentary on Question:

Candidates performed well on the first part of the question. The question asks the candidate to describe the factors so candidates who listed the factors without providing a description received partial credit. The second part of the question was more challenging for candidates – most candidates only received partial credit for this part of the question.

SOA Answer:

(i) Gender – incidence rate of disability varies by gender
Age – incidence of disability varies by age (higher incidence rate of disability for a group with an older population)
Industry / Occupation – there is a difference in the incidence rate of disability by industry / occupation of the group (e.g., higher incidence rate of disability for blue collar workers)
Geography – there is a correlation between incidence rate of disability and geographic location of the group
Benefit Level – a higher incidence rate of disability is generally observed for groups with a richer disability benefit as it provides a greater incentive to claim disability benefits

(ii) The credibility of experience used to develop LTD manual rates can be evaluated using subjective and objective methods.

Subjective methods - pricing actuaries make educated judgements to decide if the experience is credible. Thresholds can be incorporated to make the process more objective, for example, by requiring a minimum number of policies or a minimum number of claims for the experience to be deemed credible. The advantages of using subjective methods include simplicity and flexibility.

Objective methods include formal processes and may include the use of credibility formulas (e.g., the application of limited fluctuation credibility concepts). Starting with a pre-determined confidence interval, a block of LTD experience could be considered fully credible for rate making if observed LTC claims are within a certain percentage of expected claims for a pre-determined precent of time.

Part b:

Source(s): Issues in Applying Credibility - LTD
Question: Calculate the credibility weight. Show your work.

SOA Commentary on Question:

Candidates either performed well on this part of the question and received full credit or applied an incorrect method / formula to arrive at an incorrect answer and received no credit.

SOA Answer:

First, we calculate the number of claims needed to obtain full credibility. The formula to calculate this figure is given as follows:

Number of Claims Needed = (1.96 / 0.05) ^ 2 * (1 +(STDEV / MEAN) ^ 2))

- MEAN = Expected claims = $100,000
- STDEV = Standard deviation = $40,000

Number of Claims Needed = 1,783

Second, the formula to calculate the credibility weight is given as follows:

Credibility = Min (100%, (Expected # Claims / Claims Required for Full Credibility) ^ 0.5)

- Expected # Claims = 1,000
- Claims Required for Full Credibility = 1,783

Credibility = 74.9%

Part c:

Source(s): CP321-102-25 – Short Term Disability
Question: Calculate the 2022 area rating factors. Show your work.

SOA Commentary on Question:

A minority of candidates received full credit for this part of the question. A lot of candidates had formulaic errors and received partial credit only. The question only asks for the area rating factors and a fair number of candidates calculated the rating factors by age/gender and industry.

SOA Answer:

The observed actual loss ratio = 77%

Calculate the area factor as follows: (Current Rating Factor) * (2020 Loss Ratio) / (Actual Loss Ratio)

East = 1.07
Central = 1.04
West = 0.82

Region	GIVEN			CALCULATION		
	Current Factor	2020 Exp	Weight	**Factor**	Weight	2022 Area Factors
East	1.10	0.75	50%	**1.07**	50%	**1.09**
Central	1.00	0.80	50%	**1.04**	50%	**1.02**
West	0.90	0.70	50%	**0.82**	50%	**0.86**

The 2022 area factors are derived by applying 50% credibility to the Current Factor and 50% credibility to the calculated Factor.

Part d:

Source(s): CP321-102-25 – Short Term Disability
Question: (i) Describe rating factor discrimination concerns. (ii) Recommend an action to reduce discrimination concerns.

SOA Commentary on Question:

Most candidates received only partial credit for this part of the question. Full credit was awarded to candidates who described discrimination concerns and provided a recommendation to reduce discrimination concerns.

SOA Answer:

(i)

- Rating factors for the West Region and the Finance industry are favorable to the product as a whole – 70% loss ratio for the West Region compared to 77% loss ratio in aggregate
- 90% of the finance industry is in the West Region and is young and male; it is difficult to determine if the favorability is due to the industry, age/gender, or the region
- The favorable factors for area, age/gender, and industry may result in double counting if applied independently, resulting in premiums set too low. Low premiums can lead to anti-selection, default, and eventual insolvency if not addressed.
- The lack of age/gender uniformity across industries and regions may lead to discrimination concerns if females are charged more due to double counting. For example, women in finance can be charged more than their male peers because the higher rate of disability in the hospital industry is conflated resulting in higher disability rates for women

(ii)

- Conduct an analysis of co-variance across the rating factors
- Perform a calculation of rating factors for different cross-sectional populations
- Test for credibility of the rating factors for smaller populations

23. Spring 2023 DP #2

Part a:

Source(s): Eaton 2 – History of LTC Products

Question: Describe the key provisions of long term care (LTC) products included in the NAIC LTC Insurance Model Act and Model Regulation.

SOA Commentary on Question:

This question asked candidates to describe, rather than list, provisions of the regulation. Successful candidates described at least 4 key provisions from the initial or subsequent versions of the regulations. Many candidates described provisions from later versions of the regulation, such as the 58/85 test, requirements to offer a contingent nonforfeiture benefit, or benefit eligibility based on activities of daily living or cognitive impairment.

SOA Answer:

Early versions of the NAIC Model Act and Model Regulation included the following key provisions:

- Definition of LTC insurance: The Model Act establishes the minimum period of time that an LTC policy will cover. The definition notes that LTC insurance "means any insurance policy or rider advertised, marketed, offered, or designed to provide coverage for not less than 12 consecutive months...".
- Levels of Care: No LTC policy could provide coverage for skilled nursing care only or provide significantly more coverage for skilled care in a facility than coverage for lower levels of care.
- Conditions for Benefit Eligibility: No LTC insurance policy could condition benefits on a prior hospitalization requirement.
- Policy Renewability: The Model Regulation mandated that policies must be either "guaranteed renewable" or "noncancelable".

Part b:

Source(s): Eaton 10 – LTCI Rate Increases

Question: Complete the table below. For each of the assumptions: (i) Describe how LTC industry experience has been different from what was originally expected in the 1990s.(ii) Explain why the differences may lead to the need for a rate increase.

Assumption	Variance in Experience	Reasons may lead to rate increase
Mortality		
Voluntary Lapse		
Interest Rates		
Morbidity		

SOA Commentary on Question:

Candidates generally performed well on this question. Successful candidates correctly described how experience has deviated from original pricing expectations in part (i) and explained in part (ii)

how those deviations have resulted in the need for rate increases using key principles of LTC insurance structure and/or regulation.

SOA Answer:

Assumption	Variance in Experience	Reasons may lead to rate increase
Mortality	Mortality improvement has led to lower overall mortality than originally expected.	Higher persistency leads to the need for rate increases since more policyholders than originally assumed persist to older ages, where LTC claim incidence rates are higher.
Voluntary Lapse	Lapse rates have been much lower than originally expected. Many blocks were priced assuming ultimate lapse rates of 5% or more, but actual experience has been closer to 1%.	LTC is a lapse supported product. Premiums collected in early durations for policies that lapse without filing a claim support the payment of claims for persisting policies. Higher persistency leads to the need for rate increases since more policyholders than originally assumed persist to older ages, where LTC claim incidence rates are higher.
Interest Rates	Interest rates have been lower than expected. Interest rates were originally expected to be in the range of 6% to 8%, but actual rates have been closer to 4% for several years.	When interest rates are low, the premiums collected and used to prefund future benefits accumulate at a slower rate, generating less investment income, and fewer dollars are available to pay future benefits. This may lead to a rate increase to generate additional revenue to fund claims.
Morbidity	Early LTC policies were priced using population data and morbidity estimates varied widely. Many policies were priced using morbidity rates that were too low and actual morbidity experience has been higher / worse.	Higher morbidity could be caused by higher incidence, length of stay, or utilization. Higher total claims than originally expected leads to higher loss ratios and the need for a rate increase.

Part c:

Source(s): Eaton 10 – LTCI Rate Increases
Question: Describe how the behavior of LTC policyholders in response to a rate increase should be considered in projections of future experience.

SOA Commentary on Question:
Successful candidates described the potential anti-selective behaviors of policyholders in response to a rate increase and how those behaviors should be modeled when projecting future experience. Many candidates correctly identified potential behaviors but did not describe how they impacted future projections.

SOA Answer:
Shock lapse is the assumed rate at which policyholders will lapse as a result of the rate increase, which may be modeled as a reduction to future life counts, premium, and claims.

The benefit reduction impact assumption reflects the assumed rate at which policyholders reduce their benefits due to the rate increase, which is generally modeled as a reduction to future premiums and claims, but not life counts.

Adverse selection is also generally assumed as part of a rate increase as policyholders who persist after an increase (or retain higher levels of coverage) are generally those that believe they are more likely to file a claim at some point in the future. Healthier policyholders may reevaluate their need for coverage at the higher premium rate and decide to lapse their policy or reduce their benefits. This results in the remaining population being less healthy (i.e., will have higher average morbidity) than the population prior to the rate increase. This is generally modeled as an increase to average future claims.

24. Spring 2023 DP #6

SOA Commentary on Question:

This question was testing a candidate's ability to think critically of the impacts of product and policy changes effecting disability coverage, perform a basic pricing exercise, and to evaluate appropriateness of assumptions.

Part a:

Source(s): Skwire 12 – Group Disability Benefits

Question: Describe the primary differences between Short-term Disability (STD) and Long-term Disability (LTD) coverage.

SOA Commentary on Question:

Candidates did very well on Part (a), with most candidates earning full credit. Additional correct responses were accepted.

SOA Answer:

- STD benefits are paid weekly, while LTD is paid out monthly
- Benefit period for STD is considerably shorter than LTD, typically 13 or 26 weeks
- Much of the claim costs for STD plans come from maternity claims and accidents; whereas LTD tends to come from illness
- STD has a shorter elimination period
- Differences in definition of disability, Own occupation for STD, versus Own occupation for 24 months for LTD before switching to any occupation

Part b:

Source(s): Skwire 12 – Group Disability Benefits

Question: Recommend changes to stand-alone STD and stand-alone LTD offerings under the following scenarios. Justify your response. (i) The state recently passed legislation implementing statutory disability plans. (ii) The Sales team decides to package STD and LTD benefits into one offering.

SOA Commentary on Question:

Overall, candidates did not do well on Part (b), as they did not seem familiar with the concepts as they were presented in the source material.

SOA Answer:

(i) To avoid over-insurance, insurers need to review the new statutory disability plans and adjust offerings by increasing elimination periods or reducing the amount of benefits, so that the sum of the offered disability benefits and the state-mandated disability benefits match the desired benefit amounts. Programs will additionally require continual monitoring due to variances across states and frequent changes.

(ii) An increase in premiums for LTD is needed to reflect additional costs related to higher LTD paid incidence rates. The bundling of STD with LTD benefits makes it easier for employees to

remain out of work during the LTD elimination period. Additional considerations for changes to elimination periods to ensure alignment, and monitoring of assumptions are needed.

Part c:

Source(s): CP321-102-25 – Short Term Disability

Question: Calculate the 20X3 premium change needed for a 75-member group in the MW region. Show your work.

SOA Commentary on Question:

Candidates generally did poorly on part (c). While the question itself was for a disability product, it was essentially a premium pricing exercise, reflecting the approach of using the prior year's data to price the upcoming year's premium. Credit was also given to candidates that took a more first-principles approach without directly calculating the change in rating factors

SOA Answer:

Change in Area Factor:
MW MLR = $1,900/$,2000=95%
Experience Factor = Prior Factor*Area MLR/Total MLR = 0.95*95%/75% = 1.203
Weighted Factor = Prior Factor*0.9+0.1*Experience Factor = 0.95*0.9+0.1*1.203=0.97533
Change in Area Factor = 0.97533/0.95=1.0267

Change in Group Size Factor:
51-100 MLR = 1,600/2,000 = 80%
Experience Factor = Prior Factor*Area MLR/Total MLR = 1.00*80%/75% = 1.067
Weighted Factor = Prior Factor*0.9+0.1*Experience Factor = 1.00*0.9+0.1*1.067=1.0067
Change in Area Factor = 1.0067/1.00=1.0067

Overall Claims Trended = $7,500*1.03^2*1,000=$7,956,750

Admin Costs = 11%, Claims Adjud Costs = 2.8%, Commissions = 10%, P-Tax = 2%, Profit = 5%
Target MLR = 1 – Non Benefit Expense = 1-30.8%= 69.2% (*Note keeping Admin, Claims Adjud, Commissions, and P-tax as a value versus converting to a percentage was accepted).*

New Total Premium = Projected Claims/Target MLR = $7,956,750/69.2% = $11,498,194

Total Premium Increase for block of business = 20X3 Premiums /20X2 Premiums = $11,498,194/$10,500,000 = 1.095

Total Change for a 75 member group in MW = 1.0267*1.0067*1.095-1= 13.18%

Part d:

Source(s): CP321-102-25 – Short Term Disability

Question: (i) Critique the appropriateness of the experience weight of the prior rating factor assumption.(ii) Describe the implications of placing less weight on the prior rating factors for a 75-member group in the MW region.

SOA Commentary on Question:

For Part d (i) candidates who scored well, commented on both the strengths and the weaknesses of the assumption in their critique. For Part d(ii) candidates who were able to indicate the downstream implications of changes to the assumption received full credit.

SOA Answer:

(i) There is quite a bit of an observed difference in the recent 20X1 experience when compared with the prior area and group size factors, most notably for the MW region which performed considerably worse than the whole block of business despite having a favorable area factor. This suggests emerging experience is not consistent with prior experience and such a large weight on prior factors may be inappropriate.
However, disability coverage is volatile in a given year, and increasing dependence on the most recent year of experience can lead to premium volatility.

(ii) Lowering the weight on the prior rating factors would increase the premium increase for the group. Large increases in premium can have downstream effects on the ability to sell the product, and can lead to selection bias in which groups choose to renew.

25. Fall 2024 DP #5

SOA Commentary on Question:

Question 5 required candidates to be familiar with the various elements of pricing STD insurance, the drivers of premium changes, and different legislation that impacts it. Candidates who were able to demonstrate an understanding of the implications of changing factors within the premium did well on this item.

Part a:

Source(s): Skwire 12 – Group Disability Benefits

Question: Describe (i) The Family and Medical Leave Act (FMLA) (ii) The impact of FMLA on STD insurance.

SOA Commentary on Question:

Candidates who recognized that FMLA is not a paid benefit did well on Part A. Many candidates confused FMLA with PFML which is offered in several states, which was not the question asked.

SOA Answer:

(i) The Family and Medical Leave Act (FMLA) is a federal law that permits eligible employees to take extended leaves of unpaid absence from work for personal or family medical reasons with continued group insurance coverage from their employer without risk of termination. Employees on FMLA leave may typically be absent for up to 12 weeks over a 12-month period.

(ii) FMLA Programs have proven difficult for some employers to administer. Recognizing the complexities of administering FMLA and other leave programs, STD insurers have begun to offer full leave administration services to their customers, which include STD insurance coverage along with administrative support for FMLA, sick leave, vacation, and other leave programs.

Part b:

Source(s): Skwire 12 – Group Disability Benefits

Question: Explain the drivers of STD premium changes.

SOA Commentary on Question:

Candidates who were able to explain the drivers associated with STD premium changes performed the best on part B. Candidates who simply listed the drivers without explanation or explained the premium setting process without explaining reasons for why a STD premium may change over time were given less than full credit. Additional explained drivers received full points.

SOA Answer:

1) Increased or decreased utilization, which may be driven by the general economic outlook as people are less likely to return to work if job prospects are less than ideal.
2) Cost inflation with regards to the extent that wages are impacted since STD benefits pay as a percentage of wages.
3) Benefit changes or changes in regulation will change the expected costs of STD

4) Changes in the employer, such as growing the number of employees or changing demographics.

Part c:

Source(s): CP321-102-25 – Short Term Disability

Question: Calculate revised group size and employee participation factors for 20X3. Show your work.

SOA Commentary on Question:

Candidates did well on Part C with many receiving full points.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part d:

Source(s): CP321-102-25 – Short Term Disability

Question: The Sales Lead of Company ABC is in aggressive pursuit of providing STD insurance to Big Fish Corp., a fast-growing company with 75 employees. The Sales Lead is anticipating a wave of new sales to smaller groups of 5-9 employees and asks you to price those groups at a higher rate to subsidize offering a lower rate to Big Fish Corp.Critique the Sales Lead's request.

SOA Commentary on Question:

Candidates who demonstrated an understanding of the various implications of the Sales Lead's request on sales to small groups, regulatory restrictions, and were able to tie in the results of Part C performed the best on Part D. Candidates who described only a couple of these pieces received partial credit, and points were awarded for additional acceptable responses.

SOA Answer:

Small groups are already set to receive a larger rate increase due to their change in rating factor increasing by 2.6% compared to the 75+ group increasing by 1.4%.

Additional unwarranted increases in premium for small groups is likely to result in loss of business from small groups receiving better rates at competitors, which will result in anti-selection, and decrease the likelihood of having enough small groups to cover the needed subsidization amount for Big Fish.

The differences in volatility across the two groups is already priced for in the rating factors, and cross-subsidization would require leadership and regulatory approval.

Target loss ratio reductions (even immaterial) generally requires permission from regulators in states where the product is approved for sale. While state regulatory approval is generally required to change rates and rating factors, the key regulatory concern in rate review is the reasonability of the expected loss ratio for each class of consumer.

Big Fish can lower their premium by increasing their employer subsidy and encouraging a larger employee participation rate.

26. Spring 2024 DP #4b-f

SOA Commentary on Question:

The question evaluated the candidate's understanding of Experience Monitoring, performing A/E studies, and appropriateness of requesting rate increases for Long-term care insurance.

Part b

Source(s): Eaton 2 – History of LTC Products

Question: Describe common LTC plan design characteristics that policyholders can choose at time of policy purchase.

SOA Commentary on Question:

Many candidates did well on this part. Reasonable descriptions other than those listed below were given credit. No credit was given to candidates who listed the characteristics without appropriate descriptions.

SOA Answer:

- **Daily maximum benefit amount**: the value of benefits available for each day when services are received (e.g. up to $100/day)
- **Benefit period**: the amount of time for which benefits are received (e.g. up to 5 years)
- **Elimination period**: Period before benefits start being provided (e.g. a Policy with a 6-month elimination period will start paying for care 6 months after the policyholder satisfies the benefit trigger)
- **Inflation option**: growth in daily benefit amounts over time (e.g. annual increase equal to the change in CPI)

Part c:

Source(s): Eaton 9 – LTCI Experience Monitoring

Question: Calculate the total utilization rates by care setting. Show your work.

SOA Commentary on Question:

Candidates performed poorly on this part. The study material provided an example of how to calculate total utilization rates as the ratio between the actual (or expected) dollar value of benefits (product of days and dollars/day) and the maximum dollar benefit available (product of max days of coverage and max dollars reimbursed per day). Calculating actual rates are acceptable if a candidate demonstrated a clear understanding of what the actual utilization rates are and how they are used for A/E analysis. Alternative utilization bases that apply to other insurance products (e.g. days per 1,000 members) generally were not given credit.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part d:

Source(s): Eaton 9 – LTCI Experience Monitoring

Question: (i) Develop an actual to expected analysis for the utilization rates for 20X1 and 20X2 combined. Show your work. (ii) Interpret the results of the actual to expected analysis.

SOA Commentary on Question:

Candidates did not perform well on this part. To receive full credit, candidates needed to first compare the actual and expected utilization rates (consistent with the calculations in part C) to get an A/E result. Simply dividing actual paid claims by the maximum paid claims – which is the actual utilization rate – was not sufficient.

Candidates also need to provide an interpretation of the A/E results that demonstrated an understanding of the results of this exercise. This requires an explanation of how the results impact the business in addition to what the ratios by care setting mean.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part e:

Source(s): Eaton 9 – LTCI Experience Monitoring

Question: (i) Develop an actual to expected analysis for the claims termination rates. Show your work. (ii) Interpret the results of the actual to expected analysis.

SOA Commentary on Question:

Candidates did not perform well on this part. To receive full credit, the candidate needed to calculate the termination rate (not continuance rate) for each duration/period (not just cumulative termination rates). Candidates should then have explained how the A/E results impact the business in addition to what the ratios by duration mean. Many candidates also confused the concept of claims termination/continuance with policy lapsation.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part f:

Source(s): ASOP #18 – LTC Insurance

Question: Critique leadership's comments based on the actual to expected analyses.

SOA Commentary on Question:

Candidate performance on this part was mixed. Strong responses discussed the actuary's responsibility regarding rate setting to ensure rate adequacy and compliance with regulatory requirements. Regulators' and members' perspectives need to be considered. Basing the opinion of whether to file a rate increase solely on termination rates did not receive credit.

SOA Answer:

The rate increase should be based on rate adequacy and regulatory approval considerations instead of shareholder preference.

While the actual to expected analyses indicate that actual utilization was generally unfavorable to expected and that later terminations emerge unfavorably compared to the industry norm, the analyses alone are unlikely to support the need for rate increase due to insufficient data. In addition, the

actuary needs to consider all historical results as compared to the initial lifetime loss ratio expectations for the product.

Based on ASOP 18, an actuary should review any material variations in experience and consider reflecting changes in expectations that would make changes in premium rates for in-force business advisable, subject to regulatory review.

27. Spring 2024 DP #5

Part a:

Source(s): Skwire 12 – Group Disability Benefits

Question: Contrast Short-Term Disability (STD) and Long-Term Disability (LTD) insurance by completing the following table.

	STD	LTD
Elimination periods		
Incidence rates		
Claim causes		
Claim payment timing		
Claim volatility		
Benefit periods		
Maximum benefit amounts		
Exclusions		

SOA Answer:

	STD	LTD
Elimination periods	Very short, 7-14 days. Sometimes 0	> STD. 90 - 180 days
Incidence rates	> LTD; 10 times higher	< STD
Claim causes	Mostly maternity/accidents	Mostly illnesses
Claim payment timing	Paid weekly	Paid monthly
Claim volatility	< LTD. Smaller groups can become credible more quickly than LTD	> STD; less likely to self-insure
Benefit periods	< LTD; 13-26 weeks	> STD
Maximum benefit amounts	< LTD; employees may have funds or sick leave from employer	Higher than STD
Exclusions	Very few; less time to investigate; include acts of war or self-inflicted injuries	Pre-existing condition exclusions much more common than STD

Part b:

Source(s): Skwire 12 – Group Disability Benefits

Question: Describe optional benefits commonly available on STD plans.

SOA Answer:

- **24-Hour Coverage**: Basic STD benefits are payable for on-job, as well as off-job, injury and sickness. In this case, STD benefits are typically offset for worker's compensation payments received by the claimant.

- **First-Day Hospital Coverage**: The elimination period is waived, and benefits begin immediately, if the insured is confined in the hospital due to the disabling condition.
- **Survivor Benefit**: As with LTD plans, a lump sum benefit is payable to the insured's survivors upon the death of the insured.

Other, less common benefits, include portability (the right to continue coverage after leaving the group), and work incentive benefits.

Part c:

Source(s): CP321-102-25 – Short Term Disability

Question: (i) Calculate 20X1 profit. Show your work. (ii) Create an actual to expected study for each assumption by completing the table provided in the Excel file. Show your work. (iii) Interpret the results for each assumption.

SOA Commentary on Question:

Interpreting involved more than just describing which assumptions were better or worse than pricing. Some candidates mentioned that the unfavorable loss ratio variance is driven by higher claims and admin costs. The loss ratio is simply claims over premium. The risk and profit miss was driven by both higher claims and admin costs. It is possible to have negative risk and profit.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part d:

Source(s): CP321-102-25 – Short Term Disability

Question: You are pricing a renewal for a high-profile Northeast construction company. The same employees participate in the plan as the prior year. In the Excel spreadsheet, you are given rating factors, experience, and guidance from Lead Actuary on setting 20X2 rates. Calculate the renewal percentage increase. Show your work.

SOA Commentary on Question:

This was the most difficult part of the question. Candidates usually missed the change in base rate and retention. Candidates also struggled with calculating the experience-based rating factors. The base rate change captures the overall miss from 70% Loss Ratio to 77.5% experience Loss Ratio. To update each rating factor requires comparing the experience for that rating factor relative to the overall experience of 77.5%.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part e:

Source(s): CP321-102-25 – Short Term Disability

Question: Justify the rate increase with three supporting statements to the sales representative.

SOA Commentary on Question:

Justification involved explaining the actuarial drivers that led to the increase. Using external factors such as market competitiveness was not an acceptable approach to justifying the increase.

SOA Answer:

- Our company overall missed its loss ratio target of 70% (77.5% actual). We cannot sustain current levels of claims without increases to premium.
- This group is a construction company which has the highest rating factors and worst loss ratio out of any industry last year. The change in the industry factor is the main reason for this increase.
- The raw rate increase was already reduced using a blend of experience and the prior factors using a 50%/50% weight. Applying only partial credibility to the experience reduced the required increase.
- We are also not increasing the area factor, even though the Northeast had extremely poor loss ratios last year.

28. Spring 2024 DP #8

SOA Commentary on Question:

The question was testing the candidate's knowledge of group long term disability coverage. The different sections covered a breadth of understanding on the topic. Students generally did quite well, but occasionally did not provide detailed enough responses to earn full credit.

Part a:

Source(s): Skwire 25 – Disability Claim Costs

Question: List and describe group characteristics that impact Long Term Disability (LTD) insurance rates.

SOA Commentary on Question:

Most candidates did well on part (a). Full credit was given to the candidates who provided both the characteristics and descriptions.

SOA Answer:

1. Age – LTD claim costs typically increase with age as recovery rates decrease with age and incidence rates increase
2. Gender – the male-to-female split affects overall LTD claim costs
3. Industry – disability rates vary between blue-collar and white-collar industries, hazardous industries (e.g., mining) versus non-hazardous industries (e.g., desk job)
4. Occupation – certain occupations are more prone to disability due to the workplace environment or general lifestyle of people within the
5. Income – individuals with higher incomes tend to have lower utilization
6. Group size – Smaller and larger groups tend to have less favorable experience
7. Area – regional access to medical care or to geographic health risks affects claim costs
8. Participation - More participation among groups creates more credibility and can help mitigate risk.

Part b:

Source(s): Skwire 12 – Group Disability Benefits

Question: Describe ways group disability insurance products limit moral hazards.

SOA Commentary on Question:

Most candidates scored partial points on part (b). To answer this correctly, the candidates needed to know the definition of a moral hazard.

SOA Answer:

- Assure that the policyowner is incented to return to work through:
  - a reduction in benefits, i.e., 60% benefit,
  - their benefits are offset (e.g., 50/50, work incentive, proportionate loss).
  - Policy provision change from "own occ" to "any occ"
- Elimination period: there is a period of time where no claims are paid. The elimination period should be long enough to assure it doesn't overlap with any short-term disability coverage.

- Limitations/exclusions: self-inflicted injuries are often excluded, the length of mental disability periods is often capped at 24 months
- Group participation limits to manage anti-selection
- Managing disability: implementing rehabilitation and monitoring for disabilities to encourage members return to work.

Part c:

Source(s): Skwire 12 – Group Disability Benefits
Question: (i) Critique the plan design. (ii) Propose 4 plan design changes. (iii) Evaluate the premium impact for each plan design change.

SOA Commentary on Question:

The most successful candidates used the plan design specifics and offered commentary on each provision. Several candidates confused the definitions of "own occ" and "any occ"

SOA Answer:

(i) Critique the plan design

1. The definition of disability, covered employees, and payer of premiums are consistent with industry standards for LTD insurance. These plan design components would decrease anti-selection costs (due to 100% contribution) and encourage members to return to work to the extent they can (based on the definition of disability)
2. The benefit amount and elimination period are not in line with industry standards. The benefit amount is higher than industry standards, the elimination period is lower than industry standards. If this plan design were implemented, both the insurer and the group would incur far larger claim costs that what is typical, which may lead to insolvency.
3. Benefit offsets are applicable (e.g., an individual may become eligible for Social Security or Medicare disability payments. In this case, their benefit payments should be offset by these alternative sources)
4. Overall, I believe this proposed plan design would incur significant costs to both the insurer and group and should be revised.
5. Other reasonable answers are accepted, e.g.
    a. Elimination period is typically 13-week, 26-week or aligning with STD programs.
    b. A fixed 6% COLA is not common.
    c. The non-taxable status is not aligned with an employer paid benefit.

(ii) Propose 4 plan design changes

1. Reduce the benefit amount to 60% of pre-disability monthly earnings
2. Include the use of benefit offsets by using the proportionate loss methodology, or 2-to-1 offset.
3. Increase the waiting period to 13-26 weeks – or whatever the benefit period is for the corresponding group STD coverage – to avoid overlap with disability coverage.

4. Reduce the COLA benefit to a lower percentage (e.g., 2-3%) or to match year-over-year regional inflation to prevent losses if the actual COLA increase is lower than 6% year-over-year.
5. Other reasonable answers are accepted, e.g.
    a. Definition of disability: Own occupation during the first 24 months and any occupation after
    b. Change the tax status to be taxable as it's employer paid.
    c. Change the payer of premiums to be employee as the benefit is not taxable.

(iii) Evaluated the premium impact for each plan design change.

1. Reducing the replacement ratio to 60% would decrease the overall claim costs (and thus premium) needed to cover the group.
2. Including the use of benefit offsets would reduce the overall claim costs (and thus premium) needed to cover the group.
3. Extending the waiting period would decrease the number of claims and overall claim costs (and thus premium) needed to cover the group
4. Lowering the COLA benefit would decrease the overall premium needed to cover the group.
5. Other reasonable answers are accepted, e.g.
    a. Definition of disability: increase premiums as more claims will be covered during the first 24 months.
    b. Change the tax status: no change to premiums.
    c. Change the payer of premiums: no change to premiums.

Part d:

Source(s): Skwire 25 – Disability Claim Costs
Question: Calculate the change in the 20X2 company cost for: (i) Drivers and (ii) Non-drivers. Show your work and state your assumptions.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part e:

Source(s): Skwire 25 – Disability Claim Costs
Question: Explain why the changes in company cost may differ between drivers and non-drivers.

SOA Commentary on Question:

Candidates frequently provided answers without providing numerical support from the actual case. Some candidates incorrectly interpret the underlying risk between drivers and non-drivers.

SOA Answer:

For drivers, LTD and health/dental premiums account for 38% and 58%, respectively, of the total premiums.

For non-drivers, LTD and health/dental premiums account for 25% and 72%, respectively, of the total premiums.
Since the employee premium cost sharing is increasing dramatically for LTD and decreasing modestly for health/dental, drivers will experience an increase in premiums while non-drivers experience a decrease.

Part f:

Source(s): Skwire 25 – Disability Claim Costs
Question: Critique the changes to employee contributions in 20X2.

SOA Commentary on Question:

Candidates generally didn't perform well on this part.

SOA Answer:

The changes impact the two classes of employees differently with the drivers experiencing an increase in their premium contributions. These changes could also generate tax consequences for the employees.
The change in employer contribution on LTD premiums from 100% to 0% could cause significant anti-selection and generate future rate increases.

29. Fall 2024 DP #8

SOA Commentary on Question:

The question tested the candidates understanding of pricing considerations for Long Term Care (LTC) Insurance.

Part a:

Source(s): Eaton 2 – History of LTC Products

Question: Describe the tax-qualified benefit triggers defined within HIPAA and the benefit triggers used prior to HIPAA.

SOA Commentary on Question:

Candidates demonstrated a reasonable level of knowledge on this question, particularly the HIPAA benefits. Full credit was given to candidates that described specific criteria used to qualify for LTC coverage.

SOA Answer:

The tax-qualified benefit triggers were:

- Inability to perform at least 2 of the 6 ADLs
- Cognitive impairment that requires substantial supervision to assure the safety of the patient

The pre-HIPAA triggers were:

- A three day hospital stay prior to entering a care facility
- Medical necessity, as determined by a physician

Part b:

Source(s): Eaton 9 – LTCI Experience Monitoring, Eaton 2 – History of LTC Products

Question: (i) Calculate the experience-based aggregate days utilization and dollars utilization rates by site of care. Show your work. (ii) Recommend days utilization and dollars utilization assumptions by site of care to be used for projecting XYZ's existing LTC block. Justify your response.

SOA Commentary on Question:

Candidates did well in determining the aggregate days utilization, but struggled with determining the dollars utilization. The dollars utilization is a two step calculation. Most students provided total utilization.

Full credit was given for thoughtful justifications for the response, such as including commentary about credibility, identified trends, or the current duration of the block.

For part (ii), the graders provided credit for offering a recommended rate that was consistent with the response in part (i), even if the initial response was inaccurate.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part c:

Source(s): Eaton 9 – LTCI Experience Monitoring, Eaton 2 – History of LTC Products
Question: Calculate the difference in aggregate historical paid claims for each site of care between the existing expense reimbursement benefit design and: (i) Indemnity benefit payment (ii) Cash disability benefit payment. Show your work.

SOA Commentary on Question:

Many candidates struggled with these calculations. Partial credit was provided for properly defining the two benefit payment methods.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part d:

Source(s): Eaton 10 – LTCI Rate Increases
Question: (i) Critique the Chief Marketing Officer's position. (ii) Explain how a rate increase may be justified.

SOA Commentary on Question:

Candidates demonstrated a solid knowledge of these concepts. Full credit required specific critique of the CMO's positions. Many candidates provided a description of the considerations behind analyzing LTC insurance rate adequacy without specifically addressing the CMO's position. Partial marks were awarded for reasonable alternative justifications not outlined in the model solution.

SOA Answer:

- The Chief Marketing Officer is incorrect. Premiums may not continue to be higher than expected and paid claims may not continue to be lower than expected given these updated assumptions.
- LTC is a long-term policy, so it can take many years for us to see the effect of incorrect assumptions. We want to make sure that we are staying ahead and updating rates appropriately in advance – that also can mean a graded approach of having several smaller rate increases rather than waiting several years and seeing the long-term effects of incorrect assumptions and trying to take a huge rate increase all at once at that time.
- A rate increase may be justified in this case because lapse rates were lower than pricing expectations. The product is lapse supported, so when fewer people lapse, that means there are more people who are still on the plan and claiming, which can result in much higher costs.
- Lower mortality also means that there will be more people on plans continuing to claim, which also can result in higher costs.
- Utilization being lower than expectations would help lower costs, but if the effect of the lapse assumptions and mortality assumptions outweighs the utilization assumption, then a rate increase may be necessary.

30. Fall 2024 DP #10

Part a:

Source(s): Leida 4 – Managing Antiselection
Question: (i) 20X1 total premium PMPM (ii) 20X1 total claim cost PMPM. Show your work.

SOA Commentary on Question:

Most candidates calculated the total premium PMPM and total claims PMPM correctly. Candidates needed to express the solution as a PMPM amount to earn full credit.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part b:

Source(s): Leida 4 – Managing Antiselection
Question: Calculate the buydown effect on premium for 20X2 as a PMPM due to member transition. Show your work.

SOA Commentary on Question:

The buydown effect is calculated by comparing the expected change, which excludes transitions, to the actual change, which includes transitions. Some candidates only compared the actual change to the year 1 premium.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part c:

Source(s): Leida 4 – Managing Antiselection
Question: Calculate the buydown effect on claims for 20X2 as a PMPM due to member transition. Show your work.

SOA Commentary on Question:

The buydown effect is calculated by comparing the expected change, which excludes transitions, to the actual change, which includes transitions. Some candidates only compared the actual change to the year 1 claims.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

Part d

Source(s): Leida 4 – Managing Antiselection
Question: Explain the difference in the changes calculated in (b) and (c).

SOA Commentary on Question:

Candidates generally performed well on this part of the question.

SOA Answer:

The difference in the buydown effect for premium compared to claims is due to premium leakage. Since only the lower cost members are transitioning to lower cost plans, the claims are not decreasing as much as the revenue.

Course CP 321
Curated Past Exam Solutions
Learning Objective #3: Reserving
Applicable SOA Questions: Fall 2020 to Fall 2024
Model Solutions

Contents

1. Fall 2023 VR #3

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: List and describe three key types of premium reserves.

SOA Commentary on Question:

This one was answered very well. Most candidates received full score.

SOA Answer:

- Gross unearned premium reserve (UPR) – Reserve that sets aside the part of premium that has been received for coverage which has not yet occurred as of the valuation date.
- Premium paid in advance – Reserve held for premiums paid before the effective/renewal date of the policy.
- Premium due and unpaid – Asset to account for late premium payments

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Calculate the four missing (?) cells. Justify your answers.

SOA Commentary on Question:

This one was answered well. One common mistake is about the UPR for the policy #001 with a single premium mode. The content can be found on page 217 of Individual Insurance, Ch. 6.

SOA Answer:

Policy 001: No UPR is needed for single premium insurance per NAIC model regulations

Policy 002: $1,100 – Annual mode premium evaluated at the midpoint.

Policy 003: 9/1/20X1 – Quarterly premium mode with GUPR showing 1/3 of the premium has yet to be earned.

Policy 004: 11/1/20X0 – Annual premium with GUPR being showing 2/3 of the premium has yet to be earned.

Part c:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Calculate the eight missing (?) cells. Justify your answers.

SOA Commentary on Question:

This one was not answered well in general. Many seemed to struggle with the application of premium reserve types as it relates to understanding the timing of premium cash flows relative to a given valuation date. Additionally, typical health insurance contracts do not allow for partial refund of monthly premium.

SOA Answer:

Policy #005 – Premium Liability: $5,000
Policy #005 – Type: Premium paid in advance
Policy #006 – Premium Received: $500
Policy #006 – Type: Premium due and unpaid
Policy #007 – Valuation Date: 10/1/20X1 -- one quarter from the policy effective date, since quarterly premium due is $3,000 and there is a premium reserve of $3,000 (presumably for Q3 20X1) being held
Policy #007 – Type: Premium due and unpaid
Policy #008 – Reserve: $0
Policy #008 – Type: No Reserve Needed - Premium paid on due date and under the assumption given we assume that the premium is fully earned (thus there is no need for a unearned premium reserve)

Part d:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Assess the accuracy of the following statements by identifying which are true or false. Justify your answer.

(i) An insurer can calculate its profits and losses by subtracting paid claims and paid administrative expenses from premium received.
(ii) Liabilities are for obligations which have not yet been incurred or not yet accrued.
(iii) Reserves are for obligations that are already incurred and accrued.
(iv) The goal of statutory statements is to match profit streams with revenue streams with some conservatism.
(v) Mid-terminal reserves are the average of the reserves held on the first and last days of the year.
(vi) For premium due and unpaid, all unpaid premium can be booked as an asset according to statutory accounting.

SOA Commentary on Question:

This one was answered very well for the first 4 statements, but not for the last two. Only few candidates understand the correct definitions of mean reserves and mid-reserves. The content is in the footnote on page 218 of Individual Insurance, Ch. 6. A few candidates understand statutory due and unpaid correctly.

SOA Answer:

(i) FALSE – reserves must be factored in to ensure that the insurer is not taking credit (in its profit & loss calculations) for money received that will be needed later to cover expenses which in some way are connected with that money
(ii) FALSE - Liabilities are for obligations that are already incurred and accrued.
(iii) FALSE - Reserves are for obligations which have not yet been incurred or not yet accrued
(iv) FALSE - This describes GAAP statements. SAP is focused on solvency and tend to be the most conservative.

(v) FALSE - Mean reserves is the average reserve on the first and last days of the year whereas Mid-Terminal Reserves is the average of the terminal reserve at the end of the current year and the preceding year.

(vi) FALSE - this is limited to the smaller of 90 days past due or one modal premium. In any case, the actuary may further limit to what is expected to be paid.

2. Fall 2023 VR #4

SOA Commentary on Question:

Part A was a straight calculation question where the candidate had to apply the prospective reserve formula and the retrospective reserve formula in order to solve for the unknowns. Candidate performance varied widely on part A with several candidates solving the entire question while many other candidates were unable to develop an answer to any component. Common candidate problems included not placing timeline correctly (premiums paid at beginning of year, claims paid in middle of year, lapses occurring at end of year) and not applying retrospective reserve formula to solve for D and E.

Part B requested a calculation of the year 3 reserve using a two-year full preliminary term method. In this case all information necessary to calculate the reserve was in the original data. Candidates performed poorly on this part with the majority of the candidates not scoring any points. Many candidates identified that under the 2YFPT method, reserves for time 1 and time 2 would be zero but failed to recognize the need to recalculate a net premium using data for just years 3 forward.

Several candidates indicated they ran out of time to complete the answer. It was unclear whether this was the time they allocated for this question or whether they put this question off until the end of the exam and this was time for the total exam.

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: Solve for A by using prospective formula (reserve=PV Benefits-PV Net Premium) and reserve at 12/31/20X4:

141,094.55=7250*100*1.05^-.5-100A

A=5664.33

Solve for B by using prospective formula:

B=(7250*100*1.05^-1.5+6840*300*1.05^-.5)-5664.33*(100/1.05+300)

B=434,696

Solve for C by using prospective formula

C=(7250*100*1.05^-2.5+6840*300*1.05^-1.5+6430*700*1.05^-.5)-
5664.33*(100/1.05^2+300/1.05+700

C=841,491,40

Solve for D by using retrospective formula (reserve=AV premiums-AV Benefits) and reserve at 12/31/20X1

824,071.11=5664.33*1000*1.05-D*1000*1.05^.5

D=5000

Solve for E by using retrospective formula and reserve at 12/31/20X2

841,491.40=824,071.11*1.05+5664.33*E*1.05-5830*E*1.05^.5

E=900

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: The reserve at 12/31/20X3 can be calculated using the retrospective formula (accumulated premiums less accumulated claims). First you must calculate the level premium under 2YFPT (PV Claims for years 3+ divided by PV exposures for years 3+).

PV Claims=7250*100*1.05^-2.5+6840*300*1.05^-1.5+6430*700*1.05^-.5=6,938,673.86

PV Exposures=100/1.05^2+300/1.05+700=1076.42

Level Premium=6,938,673.86/1076.42=6,446.08

Reserve at 12/31/20X3=700*6446.08*1.05-700*6430*1.05^.5

=125,718.80

3. Fall 2023 VR #9

SOA Commentary on Question:

This question tests the candidate's knowledge of contract reserves and the 3 different accounting approaches (SAP, Tax and GAAP) to calculating them.

Part a:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Compare and contrast the SAP and GAAP guidance on contract reserves.

SOA Commentary on Question:

Many candidates struggled with this question, earning less than 25% of the available points on average. It seemed like many candidates relied on their working knowledge of contract reserves rather than drawing specifics from the source material. Most candidates understood and commented on the purpose of contrast reserves; but, to obtain full credit, candidates needed to compare and contrast the specific components of SAP vs GAAP guidance – which most did not.

SOA Answer:

SAP

- SAP separates contracts into the following 4 types: Accident and health, P&C, Life, and deposit type.
- For accident and health, a policy that has contract reserves will use the net Unearned premium reserve and the contract reserve.
- Reserve method is a 2-year full preliminary term, and a 1 year FPT for long term care.
- Assumptions are set using minimum standards, and are implicitly locked in.
- Assumptions should be set conservatively, and the value of the reserve should be at least as great as the minimum state reserve.

GAAP

- The policies must be grouped into either short term or long term policies.
- For short term policies, a contract reserve should not be used.
- For long term policies, a contract reserve should be used.
- A provision for adverse deviation should be added.
- Set assumptions using realistic assumptions to the business, and then assumptions are locked in.
- Assumptions are allowed to be unlocked if there is a premium deficiency.
- Contract reserves under GAAP should be greater than best estimate, but less than under SAP.
- Contract reserves are set with the Net level premium method.

Both

- For both GAAP and SAP, an addition reserve may need to be added if there is a gross premium deficiency.
- Both GAAP and SAP calculate the contract reserve as the present value of future benefits and expenses minus the present value of the future premiums.
- Both GAAP and SAP need to set up a contract reserve if a policy is long term, noncancellable, has level premiums, and there is a need to pre fund future increases in claims cost.

Part b:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Describe the tax implications for contract reserves.

SOA Commentary on Question:

Candidates struggled on this question. Many candidates only commented on the tax deductibility of various contract reserves but fell short of describing any other guidance on tax reserves.

SOA Answer:

- Contract reserves are tax deductible if certain conditions are met.
- Lapse assumptions are those used to compute statutory reserves.
- The method to calculate them must be the 2 year FPT method, with 1 year for LTC.
- The value of the tax reserve must never be higher than the value of the reserve itself. Premium deficiency reserves, on the other hand, are not tax deductible

Part c:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Describe different methods of modifying contract reserve factors.

SOA Commentary on Question:

Candidates performed well on this section in general. However, candidates tended to either obtain full-credit or earn almost no credit. Candidates either knew these methods earning them full-credit, or tended to describe smoothing methods of other types of reserves earning them low or no credit. Many candidates discussed the implications of unlocking GAAP assumptions, which also was not awarded credit.

SOA Answer:

- Do nothing approach: This is where you do nothing to modify contract reserve factors, and assume there will be a premium increase to offset the increased claims cost.
- Benefit rider approach: This is where you add a benefit rider contract reserve that represents the increased cost from the claims increase.
- Proportional approach: This is where you increase assumptions and reserves proportionally to the increase in claims.
- Loss ratio method: this is where you use the loss ratio (Claims/Premium) to increase the contract reserves factors when there is an expected increase in claims cost.

4. Spring 2021 FV-A #3b

SOA Commentary on Question:

In general, this question was poorly answered. No candidate was able to achieve full marks on this question.

Part b:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Calculate the fixed percentage of salary that will be offered as a benefit based on your manager's request. Show your work.

SOA Commentary on Question:

Part b) contained a mix of answers: either candidates understood the concept and got many points, or they did not and got very few points. Only a handful of candidates understood that maximum reserve would be at time 3, just at the beginning of LTD payments and after they have completed the elimination period.

SOA Answer:

Desc	50 yo	60 yo	Total
Salary:	$72 000	$96 000	
Monthly benefit	$6 000	$8 000	
Coefficient Calculation			
t=3:	$6 000	$8 000	
t=4:	$5 629	$7 804	
t=5:	$5 260	$7 610	
V3	$16 888	$23 414	$40 302
Max reserve:			$30 000
Formula :			74,4%

	Probability	
Discount	50 yo	60 yo
1,000	1,000	1,000
0,997	0,941	0,979
0,993	0,882	0,957

Calculation example at t=5 for a 50-year-old:

= $6,000 x 0.993 x 0.882
= $5,260

Final answer: 74.4%

5. Spring 2023 VR #2a

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: Calculate the reserve per in-force policy for each year, using the prospective method for years 1 and 2, and the retrospective method for years 3 and 4. Show your work.

SOA Commentary on Question:

Many candidates received no grading points on this one, and few candidates earned full credit. Many candidates were not able to calculate persistency correctly. Not all candidates calculated net premiums correctly. For reserves calculation, if the formula is correct but the calculation was wrong due to wrong persistency in previous step, we gave partial credit.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

6. Spring 2023 VR #7b-e

SOA Commentary on Question:

Candidates were largely successful at answering key points about an Appointed Actuary and the Reserve types. However were slightly less successful when attempting to apply the definitions. Candidates struggled with Part D.

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Contrast the purposes of an Unearned Premium Reserve and a Contract Reserve.

SOA Commentary on Question:

Candidates were successful in defining bot the unearned premium reserve and the contract reserve. However, very few candidates discussed the purpose of the reserve and its impact on a company's finances. Partial credit was awarded for defining however many candidates did not receive full credit due to not contrasting the two reserves.

SOA Answer:

Unearned premium reserves represent the portion of premium collected which is needed to cover the period for which coverage/service is intended, such as a product where premium is collected at the start of the year for a full year coverage period. Unearned premium reserves are needed to reduce fluctuation in profitability stemming from premium collection patterns.

Contract reserves represent the portion of current and past premiums needed to prefund future costs, such as a product with level premium where costs increase in later benefit periods. Contract reserves are needed to avoid overstating the insurer's net worth and reporting excessive profits in early years.

Part c:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Describe circumstances in which Mockingbird would not need to hold a Contract Reserve.

SOA Commentary on Question:

There was a wide variety of responses for this question and largely candidates performed well. Even if candidates were not able to suggest an alternative they still received some credit for explain why a Contract Reserve was necessary for Mockingbird.

SOA Answer:

- In cases where a contract cannot be continued after 1 year from issue, or
- If rates are determined such that each policy year's premium is designed to cover that policy year's costs with no prefunding of future years needed

Part d:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Explain why having appropriate Claims Reserves, Unearned Premium Reserves, and Contract Reserves may not always be sufficient to demonstrate reserve adequacy under Statutory Accounting Principles (SAP)

SOA Commentary on Question:

Of this entire question, candidates struggled the most with part d. Many were listing reason why the reserve set would not be appropriate (adverse events, etc.) rather than focus on the practice of reserve adequacy.

SOA Answer:

- Reserve adequacy demonstrated under SAP using a Gross Premium Valuation
- Compares present value of future claims, expenses and ending reserves with the present value of future premiums and current reserves
- Even when Unearned Premium Reserves and Contract Reserves are appropriate, a Gross Premium Valuation may determine a need for a Premium Deficiency Reserve (PDR) to recognize a loss in the current period
- When a Gross Premium Valuation determines reserves to be inadequate, there may be a need to recognize a loss in the current period (e.g., PDR)

Part e:

Source(s): CP321-107-25 – Health Insurance Accounting Basics, Leida chapter 6 – Reserves and Liabilities

Question: Calculate the following: (i) Disabled life reserve as of 1/31/2022 (ii) Unearned Premium Reserve as of 1/31/2022. Show your work.

SOA Commentary on Question:

Alternate solutions were considered that included all four people and/or using duration from policy start date with appropriate justification.

For part ii, full credit was also awarded if candidates recognized no premium is being earned because of waiver of premium.

SOA Answer:

	Reserve factor (for $1 of monthly benefit)	**Benefit factor**	**Disabled life reserve** = reserve factor * benefit factor
person 1	70.84	$4,000/$1	$283,360.00
person 2	31.13	$2,500/$1	$77,825.00
person 3	69.13	$3,000/$1	$207,390.00
person 4	0	$1,500/$1	$0.00
	Months of unearned prem	**Gross Monthly premium**	**Unearned Prem Reserve**
person 1	all earned because paid monthly	$5.00	$0
person 2	1/12 earned	$3.50	$3.50 * (12 - 1) = $38.50
person 3	1/12 earned	$6.00	$6.00 * (12 - 1) = $66.00
person 4	25 months earned	$4.50	$4.50 * (60 - 25) = $157.50

7. Spring 2024 VR #5

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities ; CP321-107-25 – Health Insurance Accounting Basics

Question: Explain how each of the new products will affect the overall size of contract reserves held by the company. Justify your answer.

SOA Commentary on Question:

Most candidates were able to identify correctly which products required a contract reserves, but many candidates struggled to justify their responses. In particular, very few candidates were able to justify why Group LTD does not require a contract reserve.

SOA Answer:

The following will increase the contract reserves:

- Issue age individual Medicare Supplement business
- Individual long term care (LTC)
- Individual long term disability (LTD)

The following will not change the contract reserves:

- Attained age individual Medicare Supplement business
- Group LTD
- Individual Medicare Advantage plans

Contract reserves are held for long term policies where prefunding of claims occurs. This is most common in individual policies that are issue-age rated and / or are underwritten (Issue Age Med Supp, Ind LTC, and Ind LTD) since these products typically have level premiums, while claims are expected to increase over the duration of the contract. This is driven both by a general increase in claims with age as well as underwriting wearoff.

Contract reserves are not required for individual policies that are attained-age rated and not underwritten (AA med sup, Medicare advantage). These policies are short term in nature and do not prefund claims as long as premiums are adjusted to align with expected claims.

Group LTD has limited underwriting and insurers typically adjust rates for the group's age mix each year. As a result, group LTD does not have structural prefunding of claims, and so contract reserves are not needed.

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: Calculate the net level premium for the block. Show your work.

SOA Commentary on Question:

Most candidates were able to calculate the discount and claims correctly, but many candidates missed the persistency being 100% for the first year and then changing to 85% for the remaining years. Other candidates used formulas that assume claims and premiums are spread evenly throughout the year.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

8. Fall 2022 FV #3

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Describe studies and considerations for evaluating the adequacy of claim reserves for long-term benefits.

SOA Commentary on Question:

Most candidates correctly identified and described run-off studies and actual-to-expected claim termination studies. Very few candidates included any consideration listed under "special considerations". Listing and describing four points (i.e., run-off studies, A/E claim termination rate studies and two of the special considerations) were awarded full marks.

SOA Answer:

- Runoff Studies: Previous reserve balances are compared to subsequent payments and reserve balances, with appropriate adjustments for interest.
- A/E Claim Termination Rate Studies
  - Compares actual claim terminations experienced by a company to expected claim terminations.
  - A/E ratios of greater than 1 indicate more claims are terminating than assumed in reserve basis, meaning reserve basis is adequate.
- Special Considerations
  - **Credibility**: It is important to ensure that there is sufficient data in the study before drawing conclusions about the experience.
  - **Types of terminations included**: Generally speaking, only those terminations due to recovery and death should be included, since most morbidity tables reflect only these types of terminations. Claims that terminate due to the end of the benefit period or the presence of a benefit limitation should not be counted as terminations.
  - **Exposure Characteristics** that are not reflected in the morbidity basis may require multiple A/E studies.
  - **Voluntary Claim Settlements**: These are often excluded in studies since settlements are usually offered only to claims that have a low probability of death or recovery and are expected to continue receiving payments in the absence of a settlement. Counting settlements as claim terminations may result in an overstatement of A/E claim termination rates.

Part b:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Calculate the tabular claims reserves for the member above as of: June 30, 2022; July 31, 2022; August 31, 2022. Show your work.

SOA Commentary on Question:

Most candidates did well calculating the tabular reserves, with many candidates receiving full marks. Most candidates correctly applied the formula of benefits x continuance x discounting. Common mistakes included miscalculating the continuance factor (not using the average in the numerator) and using an annual discount rate (rather than monthly). Each part of the calculation was considered separately when awarding points – candidates were not penalized for the same mistake multiple times.

SOA Answer:

(b) Uses the formula

$$V_n = \sum_{t=n}^{BP-1} Benefit_{t+1} \cdot \frac{l_{t+0.5}}{l_n} \cdot (1+i)^{-(t-n+0.5)/12}$$

Where:
n = Claim duration at the valuation date, in months (the claim reserve is computed as of the end of duration n)
Benefit = Benefit paid in month t. The first benefit occurs in the month immediately following the valuation date.
t = Claim duration, in months from claim incurral date
BP = Final claim duration in which benefits may be paid
l_x = Value from continuance table at claim duration x for the appropriate age at disability
i - Annual interest rate

This formula assumes that claim payments are made in the middle of a month, so thecontinuance and interest discount terms reflect a mid-month assumption. continuance values for the middle of a month are computed through averaging:

$$l_{x+.50} = \frac{l_x + l_{x+1}}{2}$$

Determine age at disability — 64.54 used 64 column
Determine n for each date
Disabled at — 04/01/2022
Elimination period — 04/01/2022 — 07/01/2022
First payment is — 07/15/2022
Determine when person turns 65 — 10/01/2022
Last payment is — 09/15/2022
so need to use half duration values for age 64 for part c

x	used 64 column		
0	1,000	4/1/2022	
1	950	5/1/2022	
2	900	6/1/2022	6/30/2022 BP
3	850	7/1/2022	
4	800	8/1/2022	
5	750	9/1/2022	
6	700		
7	650		
8	600		7/31/2022 BP
9	550		

6/30/2022 BP

n	t	b_{t+1}		$l_{t+0.5}/l_n$	$(1+i)^{-(t-n+.5)/12}$	product
6	3	3	$2,500	0.9706	0.9984	$2,422.51
	3	4	$2,500	0.9118	0.9951	$2,268.26
	3	5	$2,500	0.8529	0.9919	$2,115.00
						$6,805.77

7/31/2022 BP

n	t	b_{t+1}		$l_{t+0.5}/l_n$	$(1+i)^{-(t-n+.5)/12}$	product
6	4	4	$2,500	0.9688	0.9984	$2,417.92
	4	5	$2,500	0.9063	0.9951	$2,254.54
						$4,672.47

8/31/2022 BP

n	t	b_{t+1}		$l_{t+0.5}/l_n$	$(1+i)^{-(t-n+.5)/12}$	product
6	5	5	$2,500	0.9667	0.99837	$2,412.72
						$2,412.72

Part c:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: List common data integrity issues associated with long-term benefit reserves.

SOA Commentary on Question:

Most candidates correctly listed common data integrity issues associated with long-term benefit reserves. Full marks were awarded for listing at least 6 of the points listed below.

SOA Answer:

- Missing Data
- Misstated age or gender
- Inaccurate elimination periods or benefits periods
- Incomplete or inaccurate information on benefit integration
- Inaccurate or inconsistent determination of the incurred date
- Inaccurate information on cause of disability
- Incorrect coding of claim status (open, closed, pending)

Part d:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Calculate the sufficiency or deficiency of the reserve for this member as of July 31, 2022. Show your work.

SOA Commentary on Question:

Candidates that did well on part (b) also did well on part (d). Part marks were awarded to candidates who did not correctly calculate the reserve, but did correctly compare part (d)'s reserve to part (b)'s and state whether there was a sufficiency or deficiency. Common mistakes made on part (d) are consistent with mistakes made in part (b).

SOA Answer:

Determine n for each date

x	still use 64 column			
0	1,000	2/1/2022	7/31/2022	
1	950	3/1/2022		
2	900	4/1/2022		
3	850	5/1/2022		
4	800	6/1/2022		
5	750	7/1/2022		
6	700	8/1/2022		
7	650	9/1/2022		
8	600			
9	550			

BP	n	t	b_{t+1}	$l_{t+0.5}/l_n$	$(1+i)^{-(t-n+.5)/12}$
8	6	6	$2,500	0.9643	0.9984
	6	7	$2,500	0.8929	0.9951

product	vs	original			
$2,406.78					
$2,221.23					
$4,628.00			$4,672.47	$44.46	sufficient

Part e:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Calculate the pending reserve for this member as of July 31, 2022, assuming the claim is reported and unpaid on July 31, 2022. Show your work.

SOA Commentary on Question:

Most candidates did not do well on part (e). Most candidates applied a single pending factor to the previously calculated reserve and did not consider past payments owed to the member. Candidates who did consider past payments owed to the member did not always apply a pending factor to these payments and/or accumulate interest.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

9. Spring 2022 FV #2a

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: (i) Critique the accuracy of your direct report's calculated pending reserve using your own estimate from the continuance table provided. Show your work (ii) Evaluate how the pending reserves may change based on the follow-up email

Claim Duration (months)	Age 40 at Claim
0	1000
1	960
2	920
3	880
4	845
5	815
6	790
7	765
8	745
9	725
10	0

You receive a follow-up email from your direct report.

> *Hi, it turns out I had it backwards on when we were informed of the claim. Rather than one month after the end of the elimination period, it's supposed to be one month before the end of the elimination period. Sorry about that!*

SOA Commentary on Question:

Part (i) was very well answered by most candidates. Where most candidates went wrong, they didn't assume payments occurred mid-point. Points were still provided if their assumptions for beginning or end of month were clearly stated. Some candidates forgot to provide critique on the analyst's results after performing the calculations. Some candidates did not properly use the continuance factors at time 4, but rather another time period. Some candidates confused the pending reserve with the tabular reserves.

For Part (ii), most candidates had a good understanding as to the impact this change would have on the pending reserve. Some candidates provided contradictory statements without explicitly stating the impact on the pending reserve.

SOA Answer:

See the accompanying Excel file for a full solution.

For pending claims that have completed the elimination period, the claim reserve may be computed as the product of the pending factor and the sum of (a) the tabular reserve at the current claim

distribution, and (b) the accumulated value of past claim payments that have not yet been made since the claim is not yet approved.

For pending claims that are still in the elimination period, the claim reserve may be computed as the product of the pending factor and the tabular claim reserve at the end of the elimination period.

The correction means that the pending reserve comes down, as there are not yet any accumulated claims to pay out.

10. Spring 2022 FV #3a,c-e

SOA Commentary on Question:

The responses that were sought after in this question included lists, descriptions, calculations, and assessments. In general, candidates are reminded to be cognizant of the differences between these qualifiers. With this said, candidates generally fared well with this question from an overall standpoint. Additional commentary is provided below

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: Describe challenges facing actuaries valuing Group health and disability business

SOA Commentary on Question:

Candidates generally fared well with this question, but are reminded to remain cognizant of the difference between questions that ask to "list" versus questions that ask to "describe." While the model solution includes items that appear in the syllabus, candidates were equally rewarded for describing other valid challenges facing actuaries valuing Group health and disability business, for example with regards to challenges in appraising GH&D insurance carriers

SOA Answer:

The following challenges face actuaries valuing Group health and disability business:

1. Group insurance encompasses employer group, association, creditor and what in some companies is referred to as "special risks", which is typically a form of group insurance with emphasis on accidental injury and death. Contract features, underwriting and claims experience, reporting systems, compensation and other expenses, benefit provisions and reinsurance will usually differ among these different lines.
2. There is a wide variety of benefits and financial arrangements
3. For groups beyond a certain size, contracts are usually the result of negotiation and thus involve customization to meet the client's specific needs. This customization creates additional complexity in the valuation. Valuing the liabilities for these policies requires familiarity with the specific contract terms. There may be a main contract and one or more side agreements, usually for refund accounting. Sometimes, the documentation of these agreements is poor. Terminology varies greatly.
4. Third party administrators (TPAs) are common and their record keeping and administration practices do not always meet the actuary's needs.
5. Large groups are commonly subject to refund accounting, which adds an additional degree of complexity to the valuation work. Because the actuary's valuation is prospective in nature, the liability for future experience rating refunds reflects the refund accounting rules or bases, and may not be simply equal to the group's surplus at the valuation date. This is particularly true where the statutory and policyholder valuation bases differ.
6. There is a wide variety of benefit types, contract provisions and rating practices. Reliable and consistent experience data are often scarce.
7. While group contracts are traditionally of a short-term nature, the term of the

liability for some of these coverages would be determined on a seriatim basis and related to the ages or lifetimes of the individual participants, similar to individual insurance.

8. There are often data issues affecting the valuation of group life and health plans.

Part c:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: List factors to consider for setting termination rate assumptions for Group Long Term Disability (LTD).

SOA Commentary on Question:

Candidates generally fared well on this question. Some candidates, however, mistakenly listed considerations in conducting Group LTD actual-to-expected termination experience studies, e.g. ensuring the removal of settled claims from the data, which is different from "setting termination rate assumptions." With this said, similar to part (a), other valid responses were equally rewarded. In order to get full credits, candidates only needed to list 4 valid items. Additional credit was awarded for relevant items not identified in the list below. Reminding candidates again to pay heed to verb phrases (in this case "list") and not waste valuable exam time providing detailed descriptions of items

SOA Answer:

- Changes in the level of benefits provided
- Changes in claims administration practices
- COLA benefits
- Changes in government plan definition of disability

Part d:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: Calculate the gain/loss by duration and in total. Show your work

SOA Commentary on Question:

Candidates generally fared well on this question. While most candidates calculated the gain/loss by extrapolating the 1/1/2021 reserves to 12/31/2021 and then comparing to actual as indicated in the model solution below, some candidates back-projected the 12/31/2021 reserves to 1/1/2021 and compared to actual at that point-in-time instead. While the calculation of the gain/loss at 12/31/2021 should be implied, the question did not specify this, and so candidates who back-projected to 1/1/2021 were not deducted exam points.

The most common technical error from candidates was the incorrect application of interest on payments (if interest was applied at all). With this said, the use of simple interest or compound interest were equally acceptable. Furthermore, many candidates performed a gain/loss calculation on the "current year" – despite the 1/1/2021 reserve being labelled as not applicable. Candidates who performed this calculation, but failed to state the assumption of a $0 reserve, did not receive full exam points.

Other Commentary on Question:

It is worth noticing that the source material for this type of question discounts the cash flow and reserve amounts to the beginning of the year. If your question does not specify the time period on which to evaluate the Gain/(Loss) just be sure to state the assumption you make to answer the question.

SOA Answer:

At claim duration 11, the gain/loss is calculated as:

a. Reserve at 1/1/2021: $281,000
b. Benefits payments for 2021: $48,000
c. Interest for 2021: 2.00% * ($281,000 - $48,000 * 0.5) = $5,140
d. Expected reserve at 12/31/2021 (a. – b. + c.) = $238,140
e. Actual reserve at 12/31/2021 = $241,000
f. Gain/Loss (d. – e.) = Loss of $2,860 (i.e. actual reserve was $2,860 higher than expected)

A similar calculation would be performed for every other duration, leading to a final result summarized as follows:

Claim duration	Reserve at 12/31/2021 (expected)	Reserve at 12/31/2021 (actual)	(Loss)/Gain
11	$238,140	$241,000	($2,860)
10	$59,290	$62,000	($2,710)
9	$65,430	$67,000	($1,570)
8	$68,500	$73,000	($4,500)
7	$76,690	$80,000	($3,310)
6	$97,080	$99,000	($1,920)
5	$106,240	$102,000	$4,240
4	$119,520	$117,000	$2,520
3	$149,150	$146,000	$3,150
2	$183,980	$172,000	$11,980
1	$230,100	$219,000	$11,100
Total	**$1,394,120**	**$1,378,000**	**$16,120**

Alternative answer provided in the accompanying Excel file

Part e:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: Assess the adequacy of the reserve as of 2021-12-31. Justify your answer

SOA Commentary on Question:

While almost all candidates received credit for this question, the scores varied widely. Candidates who simply looked at the overall gain/loss from part (d) and concluded "adequate" or "not adequate" were not provided with full marks.
Candidates who supplemented their response with additional observations, such as the differences by duration, and suggestions for actions to further investigate those observations were provided with full marks

SOA Answer:

The reserve for the overall block is adequate as of 12/31/2021, as there is a gain of $16,120. However, as there appear to be gains at early durations followed by losses at later durations, this may be indicative of termination assumptions that are too aggressive at the longer durations and not aggressive enough at earlier durations. I would suggest performing a termination study to bring future gain//loss activity closer to $0, regardless of duration

11. Spring 2021 FV-A #4

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: List and describe common policy provisions that should be considered in LTD claim reserving.

SOA Commentary on Question:

For part (a), the question said 'list and describe'. Some candidates didn't describe the provisions they listed.

SOA Answer:

- Cost of Living Adjustments (COLA) – COLA benefits increase the amount of claim payments for inflation.
- Partial and Residual Benefits – Benefits are paid at less than 100% of the monthly benefit if the claimant is able to work part-time during a period of disability.
- Survivor Benefits – Death benefit payment is paid to a beneficiary if the claimant dies while receiving benefits.
- Benefit Integration – Many LTD plans are integrated with benefits for social insurance or other benefits while on disability.
- Benefit limitations or exclusions – Many LTD benefits have a limited benefit period, such as two years, for some specified conditions.
- Waiver of Premiums – Some LTD benefits contain a provision that waives premiums if the insured is on claim or if a person's spouse has passed away.

Part b:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: Calculate the probability that Mary will still be an active claimant in one year. Show your work.

SOA Commentary on Question:

Some candidates used the wrong exhibit for claim reserve factors while others didn't realize that looking at a duration 60 reserve would mean that the age of the claimant would then be 36. Other candidates ignored the given reserves, and instead tried to calculate reserves from scratch.

SOA Answer:

Identify reserve factors to use from exhibit 4 ($1 benefit)
F(35, 48): 136.00
F(36,60): 135.35

Scale the factors to Mary's benefit
F(35, 48): 136.00 x $3,000 = $408,000.00
F(36,60): 135.35 x $3,000 = $406,050.00

$$V_n = \sum_{t=n}^{BP} Benefit_t \cdot Continuance_t \cdot InterestDiscount_t$$

Set up formula relating the factors:
Age 35/48 factor = PV next 12 monthly payments + Age 36/60 factor x continuance x discounting

$408,000.00 = $34,465 + $406,050.00 x continuance x discounting (1/1.05)
Continuance = 96.59%

12. Spring 2022 FV #11a-e

Part a:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Describe the ultimate test of reserve adequacy according to Statutory Accounting Principles (SAP)

SOA Commentary on Question:

Candidates were very successful with this part of the question and were able to describe in appropriate detail the Goss Premium Valuation. A common mistake was to exclude the present value of the reserve as part of their response.

SOA Answer:

For SAP, a prospective Gross Premium Valuation (GPV) is the ultimate test of reserve adequacy. A GPV compares the present value of future claims, expenses, and ending reserves (unearned premium, claim, and contract) with the present value of future gross premiums and current reserves (unearned premium, premium deficiency, claim, and contract). Extra reserves need to be recorded if the gross premium valuation determines any reserve inadequacy.

Part b:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Describe the purpose and implications of the test in part (a).

SOA Commentary on Question:

Again, candidates were successful in describing the purpose and implications for the Gross Premium Valuation

SOA Answer:

- NAIC Guidance states that inflation of future benefit costs should be recognized in reserve factors so that actual costs do not diverge significantly from future projected cost levels.
- This analysis/test must be performed whenever a significant doubt exists as to reserve adequacy with respect to a major block of contracts or with respect to the insurer's health business as a whole.
- If a deficiency is found through the gross premium analysis, immediate loss recognition must be made and the reserves are to be restored to an adequate level.

Part c:

Source(s): CP321-104-25 – Preparing Health Contract Reserves
Question: Calculate whether extra reserves, as of 1/1/2021, need to be recorded based on SAP. Show your work. Justify your answer

SOA Commentary on Question:

Most candidates were able to calculate the additional reserve needed based on the numbers provided. Common mistakes were miscalculating the monthly interest rate, not recognizing all payments as being made at the end of the month, even though this was stated in the question and not fully justifying their response or making a recommendation

SOA Answer:

PV Factor	PV (Claims)	PV (Expenses)	PV (Premium)
0.996	$13.9	$2.0	$19.9
0.992	$18.8	$2.0	$19.8
0.988	$16.8	$2.0	$19.8
0.984	$19.7	$2.0	$19.7
0.980	$17.6	$2.0	$19.6
0.976	$21.5	$2.0	$19.5
0.972	$14.6	$1.9	$19.4
0.968	$15.5	$1.9	$19.4
0.964	$11.6	$1.9	$19.3
0.960	$20.2	$1.9	$19.2
0.956	$25.8	$1.9	$19.1
0.952	$26.7	$1.9	$19.0
PV =	**$222.7**	**$23.4**	**$233.8**
GPV =		**($7.3)**	

An additional reserve of $7.3million needs to be recorded.

Part d:

Source(s): CP321-104-25 – Preparing Health Contract Reserves

Question: Compare and contrast the test in part (a) with Generally Accepted Accounting Principles (GAAP) loss recognition testing

SOA Commentary on Question:

Most candidates were able to pick up partial credit on this question successfully noting both similarities and differences in the SAP and GAAP. Candidates lost credit if they just listed features of the test but did not compare and contrast the two approaches. Additionally, some candidates did not provide enough similarities/differences for full credit

SOA Answer:

- Similarities:
  - Both are tests of reverse adequacy utilizing current best estimate assumptions.
  - In case of a deficiency, both tests require a charge to earnings (either by increasing reserves or by writing off the DAC).

- Differences:
  - Timing: Gross premium valuation is only required to be performed when the

company has a concern about reserve adequacy. Due to the complicated relationship with deferred acquisition costs, GAAP loss recognition testing should be performed as a regular course of business. Similarly, a company may have situations in which, Due to conservative SAP reserve assumptions, it has no concern about SAP reserve adequacy but finds GAAP reserves to be deficient.

- Grouping: SAP gross premium valuation tests often are performed at a relatively aggregated level, which could be as high as the company level. For GAAP, FAS 60 requires the testing to be performed using groupings consistent with how products are acquired, serviced, and measured. The minor wording differences between the SAP and GAAP guidance are not intended to signify a major difference in groupings. But differences in granularity of testing may arise from the fact that SAP reporting is performed at the legal entity level, whereas GAAP reporting is performed at the consolidated enterprise level. There appears to be a wide variety of practice and interpretation in this area.
- Treatment of expenses: A SAP gross premium test is to include all expenses, whereas the GAAP gross premium recoverability testing is required to include only settlement and maintenance costs.
- Conservatism: Many actuaries believe the SAP gross premium test should be based on assumptions that would produce an adequate reserve under moderately adverse development. GAAP gross premium tests generally are believed to be performed based on assumptions that represent the expectation of ultimate outcomes. Assumptions involving future morbidity improvement and future rate increases may be appropriate for GAAP purposes but inappropriate for most SAP purposes

Part e:

Source(s): CP321-104-25 – Preparing Health Contract Reserves

Question: Recommend three methods of modifying the reserve factors that would be appropriate for GAAP reporting. Justify your recommendations

SOA Commentary on Question:

Candidates struggled on part (e) of the question. Many were unable to recommend appropriate methods. Those who did, often didn't delineate between approaches that were appropriate for GAAP reporting and those that were not. Finally, candidates could have received more credit if they justified their recommendations rather than just listing and describing the approaches.

SOA Answer:

- There are a number of approaches to recognizing inflation of future benefit costs. Reserve factors should always be developed recognizing any anticipated increase in benefit costs that results from the aging of the insured individuals. Additional cost increases that are projected to arise from inflation, general changes in utilization, etc., may also be incorporated in the initial development of reserve factors. If that is not done, or if the actual cost increases diverge significantly from the projected levels, it will be necessary to modify the reserve factors
  - **Do nothing approach**: Reserves are based on initial level of benefits with no adjustments made for future actual increases in benefits after issue. Future

increases in benefits are funded by the potential for future increases in premiums. This method should be used only when consistent with the policy rating structure and the company has demonstrated a proven ability of increasing rates in future years commensurate with the significant cost increase.

- **Proportional approach**: Multiply the contract reserve by a factor that reflects the cumulative inflationary cost increases since contract reserve factors were developed. This method hinges on consistent historical and expected future increases in the net premiums and incurred claims for the coverage.
- **Benefit rider approach**: Calculate a new set of contract reserve factors that reflect the new cost increase and add this to the prior contract reserve factors. May be easy to quantify just the impact of ER OON visits and then layer on to initially developed contract factors.
- **Loss ratio approach:** Project a target loss ratio based on pricing assumptions for a block of business. This target loss ratio will be used to develop an expected incurred claims amount. The reserve is then the retrospective difference between the expected incurred claims and the actual incurred claims to-date. This is one of the easier methods to implement and could be used as a transitory methodology until insurer has sufficient experience to develop new factors with experience data.
- **New Factor Approach** is ruled out as it would violate GAAP's lock-in principle. Assume Benefits Increase Initially is ruled out because this benefit change was not a normal inflationary event, but an unexpected benefit change

13. Fall 2020 FV-A #2a,c-d

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits; ASOP #23 – Data Quality
Question: Describe data sources and considerations for creating an LTC claim continuance table.

SOA Commentary on Question:

Most candidates did well identifying both sources and considerations. Points were given for reasonable alternative answers.

SOA Answer:

- Different tables may be used for different purposes – reserve basis, experience analysis, management reporting
- Continuance table probabilities may vary by factors such as gender, age, and benefit period
- May be based on published industry data. Consider whether industry data is applicable to your own block.
- SOA published Wilkins tables for nursing homes based on national survey
- SOA publishes periodic reports of experience based on private LTC plan experience
- Experience for specific companies varies widely from population studies
- NAIC has not specified a table for stat use
- Claim termination rates for most companies decline over time
- Most LTC insurers use their own experience if credible. Consider whether your company's experience is credible.
- Regularly should compare actual experience to assumptions

Part c:

Source(s): ASOP #23 – Data Quality
Question: Describe your ASOP 23 responsibilities regarding the review of data.

SOA Commentary on Question:

In general, candidates had a good understanding of ASOP 23. However, candidates frequently listed the responsibilities when selecting data from ASOP 23 and not the responsibilities when reviewing data.

SOA Answer:

- The actuary should perform a review, unless, in the actuary's professional judgment, such review is not necessary or not practical.
- If no review is performed, the actuary should disclose this, the reason, and any limitation on the use of the actuarial work product.
- If no review is performed, the actuary should disclose this, the reason, and any limitation on the use of the actuarial work product.
- A reasonable effort to identify data values that are questionable or relationships that are significantly inconsistent.
- Consider comparing current with prior data for consistency.

Part d:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Calculate the claim reserve at 12/31/2020 after the first benefit payment. Show your work.

SOA Commentary on Question:

Candidates generally struggled on this question. A common mistake was using 60% as the probability of remaining eligible for benefits for the second and third year. Some candidates confused the claim reserve per original policy with the claim reserve per in-force policy.

SOA Answer:

Claims reserve per ORIGINAL policy at time 0

Present Value of Future Payments =

Vo(0) = B(1) * c(0,1) * v + B(2) * c(0,2) * v^2 + B(3) * c(0,3) * v^3

where B(t) is the benefit payable at time t, c(s, t) is the probability of remaining eligible for benefits from time s to time t, and v = 1 / (1 + i) i is the assumed interest rate.

Claims reserve per IN-FORCE policy at time 1 (based on initial assumptions)

Present Value of Future Payments =

Vi(1) = B(2) * c(1,2) * v + B(3) * c(1,3) * v^2

Claims reserve per ORIGINAL policy at time 1 (based on initial assumptions)

Present Value of Future Payments =

Vo(1) = Vi(1) * c(0,1)

Formula for relationship between time 0 and time 1

Vo(0) = B(1) * c(0,1) * v + Vo(1) * v

Solve for Vo(1)

Time 0 reserve	$ 10,043,736	
n	100	number of policyholders at time 0
i	3%	
v	0.971	
Vo(0)	$ 100,437	
B(1)	$ 103,000	
c(0,1)	60%	
Vo(1) = Vo(0) / v – B(1) * c(0,1)		
Vo(1) =	$ 41,650	
Time 1 reserve	$ 4,165,048.08	based on original 100 policies, and c(0,1) = 60%
Adjust for actual persistency		
Actual experience differed from the assumption - only 50 policyholders remained eligible after 1 year.		
Expected time 1 eligible policyholders	60	
Actual time 1 eligible policyholders	50	
Adjusted time 1 reserve	4,165,048/60*50 =$3,470,873	

Or equivalently, solve for Vi(1)

Vi(1) = Vo(0) /c(0,1)	
Vi(1) =	$ 69,417
Adjusted time 1 reserve	69,417 *50 = $3,470,873

14. Fall 2020 FV-A #6

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: (i) Define cash flow testing. (ii) List the six risks identified by the National Association of Insurance Commissioners (NAIC) as being important to cash flow testing.

SOA Commentary on Question:

Most candidates had a general understanding of cash flow testing and provided a limited definition that allowed for partial credit. Only a few candidates were able to list all the risks identified by the NAIC as being important to cash flow testing. Although many candidates accurately identified morbidity, mortality and lapse, and were able to achieve partial credit.

SOA Answer:

(i) Cash Flow Testing **looks at both the assets and liability** over a set period of time. Cash Flow testing is a way to evaluate **the risk associated with the timing or amount of cash flows**

(ii)

Morbidity
Mortality
Lapse
Asset credit quality
Reinvestment
Disintermediation

Part b:

Source(s): ASOP #22 – Statements of Opinion for Asset Adequacy

Question: Describe asset adequacy analysis testing methods, other than cash flow testing, that you can apply.

SOA Commentary on Question:

Many candidates were able to fully list and describe the alternate asset adequacy analysis testing methods. Candidates typically were able to either achieve full credit on this part, or none at all.

SOA Answer

Gross Premium Reserve Test

The actuary can demonstrate that the degree of conservatism in the reserves and other liabilities is so great that moderately adverse deviations in the actuarial assumptions are covered

The actuary can demonstrate that the product designs and/or investment strategies limit moderately adverse experience from happening.

Loss Ratio Method

Part c:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Evaluate whether a gross premium reserve is necessary. Show your work and justify your answer.

SOA Commentary on Question:
This question was testing whether candidates knew the gross premium reserve (GPR) formula and could justify whether a GRP was required. Most candidates did not calculate the GPR correctly, but came to the correct conclusion that a GPR was not necessary. One of the more common errors was that candidates calculated +$69M instead of -$69M. Some candidates ignored the current statutory reserves in their calculations, but considered it in their justification for whether a GPR was necessary. Candidates received partial credit in these situations.

SOA Answer:

GPR=PV of Benefits & Expenses minus Current Reserve and Future Revenue
(69,000,000)
GPR is negative so no GPR needed

Part d:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Calculate the projected value of the deferred acquisition cost (DAC) asset per original policy after 3 years, immediately prior to recognition of the premium payment. Show your work.

SOA Commentary on Question:
This question was testing candidates understanding of DAC assets and their ability to calculate its value at a particular point in time. Most candidates had difficulty with this question and were unable to provide all the components necessary to achieve full credit. Many candidates correctly calculated the persistency and discount factors, and some were able to calculate the net level expense premium. A handful of candidates calculated the reserve on a "per surviving policy" basis, and a portion of these were adjusted to a "per original policy" basis. To receive full credit candidates need to show all the calculations and explain the steps.

SOA Answer:

-The cost of selling, underwriting, and issuing the policy is deferrable as a DAC asset.
-DAC Formula= AV(deferrable Expenses)- AV(Net Expense Premium)

-Calculate sumproduct of persistency and discount

		0.920	0.971	
Time t		Persistency	Discount	P * D
	0	1.000	1.000	1.000
	1	0.920	0.971	0.893
	2	0.846	0.943	0.798
	3	0.779	0.915	0.713
	4	0.716	0.888	0.637
				4.040

-Divide deferrable expenses by the sumproduct to get the net level expense premium. This is per year for 5 years and has present value equivalent to the deferrable expenses. 247.52

-After 3 years, immediately prior to recognition of the premium payment, there are 2 remaining net level expense premium amounts. Calculate PV of the remaining net level expense premium amounts and sum
Add them together - this is the prospective reserve "per surviving policy". 468.60

Convert to "per original policy" - this is the DAC asset at t=3 just prior to recognition of premium 364.89

15. Fall 2021 FV-A #1

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Identify and explain the four major categories of reserves.

SOA Commentary on Question:

Some candidates were able to recall all four. A small portion of the candidates confused categories of reserves with the different types of statements (statutory, GAAP, tax and embedded value based). Credit may be awarded for reasonable alternative answers.

SOA Answer:

Major categories of reserves:

1. Premium reserves – amounts set aside in financial statements to reflect premiums that have that have either (1) been received by the valuation date, but provide for insurance coverage after the valuation date, or (2) not yet been received on the valuation date, but which relate to coverage that was provided prior to the valuation date.
2. Claim reserves – amounts set aside to cover future payments for claims which have been incurred under the contract, but which have not yet been paid.
3. Policy reserves – amounts of money set aside to account for current funding of costs over the future lifetime of the policies. Account for any long term differences between the slope of the revenue and benefit streams. At times referred to as "contract reserves", "additional reserves", and "active life reserves".
4. Gross premium reserves / Premium deficiency reserves – used when the future revenue streams plus current reserves and liabilities for a given block are not sufficient to cover future costs; thus the company needs to set aside money to cover the shortfall.

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Calculate the total net level annual premium for the block. Show your work.

SOA Commentary on Question:

Candidates can receive partial credit for this question. Most candidates can calculate persistency, discount rates and present value of claims correctly. Some candidates forgot to multiply the correct net level premium per policy by 120.

SOA Answer:

Year	Claims	Persistency	Discount	PV (Claims)	Net Level Premium
0	$0.00	1.000	1.000		P
1	$1,500.00	0.800	0.980	$1,176.47	P
2	$1,620.00	0.640	0.961	$996.54	P
3	$1,749.60	0.512	0.942	$844.13	P
4	$1,889.57	0.410	0.924	$715.03	
PV of Claims per policy				$3,732.16	= Sum of PV (claims)
PV of Net Level premiums Factor				2.88	= Sumproduct (Persistency, Discount)
Solve for P				$1,295.02	= PV of Claims per policy / PV of Net Level premiums Factor
Net Level Premium for block				**$155,402.66**	**= Net Level Premium per policy * 120 Policies**

Part c:

Source(s): Leida chapter 6 – Reserves and Liabilities

Question: Calculate the total policy reserves for the block at the end of year 2 per policy still in force in year 2. Show your work.

SOA Commentary on Question:

Candidates can receive partial credit for this question. No credit was deducted if candidates did the calculation correctly using an incorrect answer from part b. Some candidates forgot to multiply the correct net level premium per policy by the number of policies. Multiplying by 120 policies or by the number of policies in force at year 2 were both acceptable for calculating the total policy reserve.

Year	Net Level Premium	Claims	Persistency	Discount
2	$1,295.02		1.000	1.000
3	$1,295.02	$1,749.60	0.800	0.980
4		$1,889.57	0.640	0.961
PV of Future Claims		$2,534.60	= Sumproduct (Claims, Persistency, Discount)	
PV of Future Premium		$2,310.73	= Sumproduct (Net Level Premium, Persistency, Discount)	
Policy Reserves		$223.87	= PV of Future Claims - PV of Future Premium	
Total Policy Reserves		**$26,864.83**	**= Policy Reserves * 120 Policies**	

16. Spring 2021 FV-A #1

SOA Commentary on Question:

The question was testing the candidates' knowledge of types of US based reserves and reserve basis. Parts (a) and (b) were list and describe questions and Part (c) was a calculation / application question. Generally the question was completed well.

Part a:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: List and describe the types of insurer financial statements that use different reserve bases.

SOA Commentary on Question:

Most responses were able to get two to three of the four insurer financial statements correct. Answers for Stat and GAAP were generally better and more complete than Tax and EV. Some people thought the question was asking about definitions of the balance sheet and income statement.

SOA Answer:

Statutory Statement

- Focus on ensuring solvency of insurer
- Tend to be more conservative than other statement basis

General Acceptable Accounting Principle (GAAP) statements

- Developed under the standards set out by the Financial Accounting Standards Board (FASB)
- Focuses on matching profit streams with revenue streams
- GAAP statements are not as conservative as statutory statements

Tax Statements

- In the U.S., the IRS requires that financial statements follow a set of standards designed to make sure profits beyond a set level are recognized and tax immediately
- Least conservative (lower reserves generates higher income and more taxes)

Embedded value based statements

- For companies who operate internationally
- Similar to GAAP in conservatism, EV calculation uses best estimate assumptions

Part b:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: List and describe the types of premium reserves.

SOA Commentary on Question:

Most answers were well done identifying the UPR, Paid in Advance, and Due and Unpaid

SOA Answer:

Unearned premium reserves (UPR)

- Reserve that sets aside the part of premium that has been received for coverage which has not yet occurred as of the valuation date

- Gross UPR is calculated as the pro-rated portion of the actual gross premium received; this is most common

Premium Paid in Advance

- A premium paid in advance reserve is held when a policyholder pays more premium than is strictly required for the current renewal period.

Premium Due and Unpaid

- Held when premium payments are owed by the valuation date but have not been received.

Part c:

Source(s): Leida chapter 6 – Reserves and Liabilities
Question: Calculate each type of premium reserve that should be held as of 12/31/2020 for each policy. Show your work.

SOA Commentary on Question:

This part was least well answered – there was much confusion on UPR vs Paid in Advance. Many used the UPR reserve in #001 and #002 instead of Paid-in-Advance. Typically Candidates who were able to provide a good definition the reserves in Part B did better in Part C. Providing description of assumptions helped candidates who did not have the right answer get partial credits.

SOA Answer:

POLICY #001 Modal premium is due on 1/1/2021. Thus, the monthly premium is not yet due. The monthly premium is $200 (= 2,400/12) Paid in advance reserve of $200
POLICY #002, Modal premium is $2,000 Because the policy isn't inforce at 12/31/2020, the full amount as a premium paid in advance reserve.
POLICY #003 Modal premium is $2,000 (=$4,000 / 2). The Oct 2020 – Mar 2021 modal premium has been paid and was already owed ½ of it ($1000) is for a period after the valuation date so is held as a Gross UPR. The Apr 2021 – Sep 2021 modal premium of $2,000 has been paid in advance and is held as a Premium Paid in Advance reserve
POLICY #004, Modal premium is $2400. This premium was NOT paid on time and thus the full amount is listed as a due and unpaid premium ($2,400). 10 months of the premium owed is for a period after the valuation date and thus 10/12 of the premium ($2000) is unearned.

17. Spring 2021 FV-A #2a,c

SOA Commentary on Question:

The focus of the entire question was on the material from the CIA Educational Note – Valuation of Group Life and Health Policy Liabilities. Questions were based on different sections which tested the candidates understanding of valuation challenges, experience rating refunds, and reserve adequacy.

Part a:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits
Question: Describe challenges you may face in the valuation of Northern Insurance Company's group and health business.

SOA Commentary on Question:

Many candidates were able to recall many of the list items below and provide a one or two line description.
The list below includes all of the acceptable points, however candidates only had to provide the text in bold and one of the subpoints to achieve full credit. Listing just the items in bold without any description was not sufficient.

SOA Answer:

- **Different lines of business**
  - Group insurance encompasses employer group, association, creditor and special risk
  - Contract features, underwriting and claims experience, reporting systems, compensation and other expenses, benefit provisions and reinsurance will usually differ among these different lines.
- **Benefit Variety**
  - There is a wide variety of benefits and financial arrangements.
  - There is a wide variety of benefit types, contract provisions and rating practices.
- **Customization**
  - For groups beyond a certain size, contracts are usually the result of negotiation and thus involve customization to meet the client's specific needs.
  - This customization creates additional complexity in the valuation.
- **Third party administrators**
  - TPAs are common and their record-keeping and administration practices do not always meet the actuary's needs.
- **Refund Accounting**
  - Large groups are commonly subject to refund accounting, which adds an additional degree of complexity to the valuation work.
  - Because the actuary's valuation is prospective in nature, the liability for future experience rating refunds reflects the refund accounting rules or bases, and may not be simply equal to the group's surplus at the valuation date.
- **Data**
  - Reliable and consistent experience data are often scarce. There are often data issues affecting the valuation of group life and health plans.

- **Liability Term Length Results in Individual (Seriatim) Reserving**
  - While group contracts are traditionally of a short-term nature, the term of the liability for some of these coverages ("group business that behaves like individual business") would be determined on a seriatim basis and related to the ages or lifetimes of the individual participants, similar to individual insurance.
  - Group administration practices apply even to groups that, for valuation purposes, behave like individual business. As a result, policy data and valuation systems may not be readily available for the actuary's valuation purposes. Moreover, while the seriatim valuation basis of the future claims liability is well accepted for some coverage (e.g., paid-up life and creditor insurance), it is not common practice for others like association group business.
  - If refund accounting applies in such cases, the refund accounting rules may not include a future claim liability of this nature. This may complicate the actuary's valuation of the liability for future experience rating refunds.

Part c:

Source(s): Skwire 40 – Claim Reserves for Long-Term Benefits

Question: Evaluate the adequacy of the claim reserves (i) For each individual claim duration. Show your work and justify your answer. (ii) For the lifetime of the policy. Show your work and justify your answer.

Employer B has been a policyholder for several years. You are given the following information on Employer B's claim reserve development during 2020. Amounts are in thousands of dollars.

Claim Duration	Reserve at 1 Jan 2020	Actual Claim Payments	Valuation Interest Amount	Reserve at 31 Dec 2020
5+	300	50	10.0	260
4	140	25	4.6	130
3	180	20	6.4	160
2	230	50	7.2	190
1	300	65	9.4	240

SOA Commentary on Question:

Candidates did very well with this question. Many were able to articulate the formula correctly and calculate the gains and losses of each duration and then calculate the sum of the gains and losses to understand the reserve adequacy over the lifetime of the policy.

SOA Answer:

The gain/loss for each claim duration and the total overall needs to be calculated.

Gain (loss)= Reserve at 1/1 – Reserve at 12/31 – claim payments + valuation interest

Claim Duration	Reserve at 1 Jan 2020	Actual Claim Payments	Valuation Interest	Reserve at 31 Dec 2020	2020 Gain (loss)
5+	300	50	10.0	260	0.0
4	140	25	4.6	130	-10.4
3	180	20	6.4	160	6.4
2	230	50	7.2	190	-2.8
1	$300	65	9.4	240	4.4

2020 total gain for the Lifetime of the Policy = 0 – 10,400 + 6,400 – 2,800 + 4,400 = -$2,

(i) **As long as the gain is equal to or greater than zero, the reserve is adequate.** Therefore, the reserve was adequate for durations 1, 3 and 5 but not adequate for durations 2 and 4 as determined by the losses during those durations.

(ii) The reserve was not adequate for the lifetime of the policy as determined by the $2,400 loss overall.**The overall gain (loss) is the sum of the individual gains and losses.**

Course CP 321
Curated Past Exam Solutions
Learning Objective #6: Retiree Group Benefits
Applicable SOA Questions: Fall 2020 to Fall 2024
Model Solutions

Contents

1. Fall 2020 FV-C #2

SOA Commentary on Question:

This question tested the candidates on their knowledge of various aspects of group retiree benefits. Results were generally mixed, with most candidates receiving most of or full credits on some parts of the question, and partial to no credit on others.

Part a:

Source(s):

Question: Explain how long term assumptions factor into the development of retiree benefit obligations.

SOA Commentary on Question:

Different long term assumptions were required in order to receive full credit. Partial credit was given for any answers given without any additional explanation.

SOA Answer:

1) Discount Rate: The rate used should reference market yields at the valuation date, and reflects the estimated timing of benefit payments.
2) Salary Escalation: Assumption should reflect employee's salary at retirement, accounting for inflation/merit increases over their career.
3) Mortality Decrement: Mortality decrements should be based on age and gender. Factors can be based on standard tables, or adjusted for the plan's own experience if it is credible.
4) Termination and Disability Rates: Adjustments for employees that exit the plan and may not be able to collect benefits. Factors can be based on standard tables, or adjusted for the plan's own experience if it is credible.
5) Retirement Rate: Assumptions should be based on age or service-basis when employees can collect benefits prior to normal retirement age.

Part b:

Source(s):

Question: Explain factors that can increase and/or decrease health care trend rates.

SOA Commentary on Question:

Full credit was only received if an explanation of how the factor impacted trend rates was given.

SOA Answer:

1) General Inflation: Increasing inflation can lead to a general increase in the cost of health care goods and services, and in turn increasing trends.
2) Utilization Changes: New health products and services can lead to higher levels of health care utilization, which will increase trend rates.
3) Behavioral Patterns: Behaviors in the general population and employee group can impact cost of care (ie, healthy lifestyles may reduce trends, while smoking can increase it).
4) The GDP: GDP fluctuations can impact government financing of healthcare, which will directly impact health care spend in the commercial market.

5) Benefit Types: Certain benefits, such as Rx, may have a different trend rate than medical coverage in general, which will have an impact on the overall healthcare trend (ie, faster growth in high cost drugs may result in higher Rx trend rates than medical trends, and result in higher overall healthcare trends).
6) Geographic Location: Health care spending patterns can differ by region.
7) Government Programs: New government programs and legislation can be passed that can lead to added medical costs (ie, mandated coverages) and thus higher trends, or vice versa.
8) Plan Provisions: Benefit designs can affect trend, as richer benefits may lead to higher spending, or less rich benefits, such as a high deductible, can reduce trends.

Part c:

Source(s):

Question: (i) Describe the components of the NPPBC. (ii) Calculate the maximum impact of all known errors in the restatement of the Company X 2019 NPPBC. Show your work.

SOA Commentary on Question:

Most candidates did well on part (i) of the question, but struggled on part (ii). As the question asked for the maximum liability, points were deducted if candidates assumed the errors in directions that would lessen the liability. Very few candidates received full credit, but most received at least partial credit.

SOA Answer:

(i)

NPPBC = Service Cost + Interest Cost + Return on Assets + Amortizations of Unrecognized Amounts

Service Cost = Active EPBO / (retirement age – current age)

Interest Cost = Discount Rate * (APBO + Service Cost – EBP/2)

Active EPBO = Number of Actives * Claims Cost * Annuity * Survival Factor * Trend Factor * Discount Factor

Active APBO = Active EPBO * Attribution Factor

(ii)

As we are given that both the return on assets and amortization of unrecognized amounts equal zero, then only the Service Cost and Interest Cost are impacted by the errors:

Service Cost
Original age impact: 1 / (65-45) = .05
Updated age impact: 1 / (65-46) = .05263
Age Adjustment: .05263 / .05 = 1.05263
We can ignore the possibility of age being off in the other direction, as that would reduce the liability

The EPBO is impacted by the annuity factor error, and must be increased by 1.007

The overall impact to Service Cost, therefore, is a product of multiplicative changes:

Age Adjustment * Annuity Adjustment = 1.05263 * 1.007 = 1.06

Interest Cost
Original discount rate: .05
Updated discount rate: .053
Interest Cost Adjustment = .053 / .05 = 1.06

As the adjustment is the same for both the Service Cost and the Interest Cost, the overall correction is 6%

Original 2019 NPPBC: $1,357,000
Maximum Error: 6%
Maximum NPPBC Liability: $1,357,000 * .06 = **$81,420**

Part d:

Source(s):
Question: Identify characteristics of an ideal funding vehicle that specifically pertain to the Controller's concerns.

SOA Commentary on Question:
The Controller was specifically concerned about tax concerns, so points were deducted for characteristics raised that did not address tax concerns specifically.

SOA Answer:

1. Company tax deductions for contributions that adequately fund retiree health benefits
2. A tax-free or tax-deferred savings mechanism for employees
3. Investment earnings that accumulate in a tax-sheltered environment
4. Tax-free benefits paid to employees

Part e:

Source(s):
Question: Recommend a funding vehicle with the characteristics identified in (d) above. Justify your answer.

SOA Commentary on Question:
For full credit, the candidate had to correctly identify a retirement vehicle that was tax advantaged, and explain the tax advantages to justify the answer. Several different retirement vehicles were acceptable.

SOA Answer:
I would recommend a VEBA, which would best address the Controller's concerns about tax implications. The money contributed by the employer is tax deductible, the funds grow tax-free, and the money can be taken out tax free as long as it is used for qualified medical expenses.

2. Fall 2021 FV-C #5

Part a:

Source(s):

Question: (i) List the accounting standards applicable to retiree plans. (ii) Describe how the standards in part (i) above affect retiree health accounting.

SOA Commentary on Question:

Most candidates did not perform well on this part. In general, the only standards candidates mentioned were FAS 106 and/or ASC 715. A common mistake was to list ASOP's that might be applicable.

SOA Answer:

- **FAS 106** requires accelerated recognition of plan costs, increasing current costs for employers, in addition to special additional assumptions. The updated version, **ASC 715**, also discusses best estimate assumptions for future events that may affect the APBO
- **GASB 43/45** is patterned after FAS 106, but for public-sector and state/local government employees
- **FASAB No. 5** gives a specific actuarial method for reporting accrual costs for U.S. federal agencies
- **IAS 19** accounts for benefits during working lifetimes, and offers less ability to smooth unexpected plan experience/plan design changes

Part b:

Source(s): CP321-111-25 – IAS19

Question: Due to a significant benefit design change effective January 1, 2020, the accumulated postretirement benefit obligation (APBO) increases 25%. (i) Calculate the unrecognized loss due to the change in benefit design. Show your work. (ii) Create an amortization schedule showing the annual balance to recognize the loss in part (i) above for all active employees over all of their years until retirement. Show your work.

SOA Commentary on Question:

In general, candidates performed well on Part (i), and received at least partial credit on Part (ii). Some candidates incorrectly applied a 10% corridor, which in this case doesn't apply as the loss is related to a benefit design change. These candidates received most of the points if the rest of the calculation was accurate. Candidates received full credit on both parts if they had the correct end result without showing each step of the calculation separately.

SOA Answer:

Part (i):

The unrecognized loss is the change in APBO:

Active APBO = Active EPBO * Attribution Factor
$1,800,000 * 0.37 = $666,000

Change in APBO = Active APBO * Plan Change Impact

$666,000 * 25% = **$166,500**

Part (ii):

To calculate the amortization schedule, the candidate had to perform the following steps:

- Calculate the Service Years Rendered for each year. This can be achieved by developing a table of future years of service for each group, or by summing the number of remaining active employees in each year.
- Calculate the Amortization Fraction (or Rate) by dividing the Service Years Rendered by the sum of the Remaining Service Years for all employees.
- Calculate the Amortization amount by applying the Amortization Rate for each year to the unrecognized loss from Part (i).
- The Beginning of Year (BOY) Balance in year 1 is the unrecognized loss from Part (i). The Amortization amount is subtracted to determine the End of Year (EOY) Balance. Either EOY or BOY Balance can be provided for full credit.

Group	# of active employees	Years until Retirement	Year	Remaining Service Years	Service Years Rendered	Amortization Fraction	BOY Balance	Amortization Rate	Amortization	EOY Balance
A	8	1	2020	8	101	10.1%	$166,500.00	10.1%	$16,816.50	$149,683.50
B	5	2	2021	10	93	9.3%	$149,683.50	9.3%	$15,484.50	$134,199.00
C	4	3	2022	12	88	8.8%	$134,199.00	8.8%	$14,652.00	$119,547.00
D	4	4	2023	16	84	8.4%	$119,547.00	8.4%	$13,986.00	$105,561.00
E	5	5	2024	25	80	8.0%	$105,561.00	8.0%	$13,320.00	$ 92,241.00
F	5	6	2025	30	75	7.5%	$ 92,241.00	7.5%	$12,487.50	$ 79,753.50
G	6	7	2026	42	70	7.0%	$ 79,753.50	7.0%	$11,655.00	$ 68,098.50
H	8	8	2027	64	64	6.4%	$ 68,098.50	6.4%	$10,656.00	$ 57,442.50
I	3	9	2028	27	56	5.6%	$ 57,442.50	5.6%	$ 9,324.00	$ 48,118.50
J	6	10	2029	60	53	5.3%	$ 48,118.50	5.3%	$ 8,824.50	$ 39,294.00
K	5	11	2030	55	47	4.7%	$ 39,294.00	4.7%	$ 7,825.50	$ 31,468.50
L	7	12	2031	84	42	4.2%	$ 31,468.50	4.2%	$ 6,993.00	$ 24,475.50
M	6	13	2032	78	35	3.5%	$ 24,475.50	3.5%	$ 5,827.50	$ 18,648.00
N	3	14	2033	42	29	2.9%	$ 18,648.00	2.9%	$ 4,828.50	$ 13,819.50
O	5	15	2034	75	26	2.6%	$ 13,819.50	2.6%	$ 4,329.00	$ 9,490.50
P	5	16	2035	80	21	2.1%	$ 9,490.50	2.1%	$ 3,496.50	$ 5,994.00
Q	6	17	2036	102	16	1.6%	$ 5,994.00	1.6%	$ 2,664.00	$ 3,330.00
R	4	18	2037	72	10	1.0%	$ 3,330.00	1.0%	$ 1,665.00	$ 1,665.00
S	2	19	2038	38	6	0.6%	$ 1,665.00	0.6%	$ 999.00	$ 666.00
T	4	20	2039	80	4	0.4%	$ 666.00	0.4%	$ 666.00	$ -
				1000						

Part c:

Source(s): CP321-111-25 – IAS19

Question: Compare the amortization schedule for this scenario, showing the annual balance for the unrecognized loss, to the schedule developed in part (b)(ii) above. Show your work.

SOA Commentary on Question:

To receive full credit, the candidate needed to calculate the correct straight line factor and then apply it accordingly; points were deducted for candidates who rounded the number to get an even dollar amount across the ten year time frame. Candidates also needed to calculate either the End of Year or Beginning of Year Balance to compare against the result from Part (b)(ii). Several candidates omitted this step and therefore didn't receive full credit.

SOA Answer:

To calculate the alternative amortization schedule, the candidate had to perform the following steps:

- Calculate the Straight Line Amortization Factor =
  Total Remaining Service Years / Current Active Lives =
  1000 / 101 = 9.901
- Calculate the Amortization Rate per year = 1/9.901 = 10.1%
- Calculate the Amortization amount by applying the Amortization Rate to the unrecognized loss from Part (b)(i). The Amortization amount is limited to the BOY Balance in the final year.
- The BOY Balance in year 1 is the unrecognized loss from Part (b)(i). The Amortization amount is subtracted to determine the EOY Balance. Either EOY or BOY Balance can be provided for full credit.
- The EOY Balance from Part (c) is subtracted from the EOY Balance from Part (b)(ii) to show the difference. The loss is recognized more rapidly under the straight line approach.

Year	BOY Balance	Amortization Rate	Amortization	EOY Balance	Difference in Loss Recognition vs. (B)
2020	$166,500.00	10.1%	$16,816.50	$149,683.50	$ -
2021	$149,683.50	10.1%	$16,816.50	$132,867.00	$ 1,332.00
2022	$132,867.00	10.1%	$16,816.50	$116,050.50	$ 2,164.50
2023	$116,050.50	10.1%	$16,816.50	$ 99,234.00	$ 2,830.50
2024	$ 99,234.00	10.1%	$16,816.50	$ 82,417.50	$ 3,496.50
2025	$ 82,417.50	10.1%	$16,816.50	$ 65,601.00	$ 4,329.00
2026	$ 65,601.00	10.1%	$16,816.50	$ 48,784.50	$ 5,161.50
2027	$ 48,784.50	10.1%	$16,816.50	$ 31,968.00	$ 6,160.50
2028	$ 31,968.00	10.1%	$16,816.50	$ 15,151.50	$ 7,492.50
2029	$ 15,151.50	10.1%	$15,151.50	$ -	$ 6,327.00
2030					$ (7,825.50)
2031					$ (6,993.00)
2032					$ (5,827.50)
2033					$ (4,828.50)
2034					$ (4,329.00)
2035					$ (3,496.50)
2036					$ (2,664.00)
2037					$ (1,665.00)
2038					$ (999.00)
2039					$ (666.00)

Part d:

Source(s):

Question: Recommend an approach to Medicare Integration that will address the CFO's concerns over the rising cost of health care. Justify your response.

SOA Commentary on Question:

Partial credit was given to anyone who recommended either the Standard or Exclusion COBs. For full credit, the recommendation had to be tied back directly to the CFO's stated cost containment goal in some fashion.

SOA Answer:

I would recommend using the carve-out method for Medicare Integration, as it produces the smallest benefit under the employer plan relative to other integration options. This method first applies the employer's benefit provisions to the covered expense, and then subtracts the Medicare payment from the remainder. As it produces the smallest cost to the employer, this would best align with the CFO's goal of containing the company's health care costs.

3. Spring 2022 FV #9

SOA Commentary on Question:

This question tested both the simplified and detailed approaches to calculation APBO, EPBO, and NPPBC for post-retirement benefits using a provided data table. Candidate performance on the question was mixed. In general, candidates had more familiarity with the detailed calculations for EPBO and APBO. Candidates were less successful calculating NPPBC and the simplified, "supervisor" approach

Part a:

Source(s):

Question: Calculate the total aggregate APBO. Show your work

SOA Commentary on Question:

This question tested ability to calculate active and retiree APBO using provided assumptions. Most candidates were able to get partial credit for properly interpreting the survival, trend, discount, and attribution factors necessary for the APBO calculation. A few candidates properly calculated the active population APBO with the retiree APBO to get the aggregate APBO

SOA Answer:

Assumptions Given:	
term rate	3.00%
disc rate	5%
ret age	65
annuity	13

	Trend	Factor
Year 1	6.00%	1.06
Year 2	5.75%	1.06
Year 4	5.25%	1.05
Year 5	5.00%	1.05
Year 6	4.75%	1.05
Year 7	4.50%	1.05
Year 8	4.25%	1.04
Year 9	4.00%	1.04
Year 10+	4.00%	1.04

Candidate is given the table below:					Calculations						
ID number	Status	Claims	Age	Years of Service	survival	trend	discount	attribution	annuity	EPBO	APBO
1341209	Active	$3,055	40	5	0.4670	2.9051	0.2953	0.1667	13	$15,910	$2,652
1358335	Active	$5,385	35	5	0.4010	3.5345	0.2314	0.1429	13	$22,958	$3,280
1358385	Active	$3,076	50	20	0.6333	1.9626	0.4810	0.5714	13	$23,905	$13,660
1358468	Active	$2,793	38	18	0.4394	3.1422	0.2678	0.4000	13	$13,427	$5,371
1358474	Active	$3,673	42	12	0.4963	2.6859	0.3256	0.3429	13	$20,723	$7,105
1358535	Active	$3,291	45	8	0.5438	2.3878	0.3769	0.2857	13	$20,937	$5,982
1358622	Active	$1,074	55	25	0.7374	1.6131	0.6139	0.7143	13	$10,196	$7,283
1358650	Retiree	$3,364	65	30					13	$43,732	$43,732
1358687	Retiree	$2,666	66	40					13	$34,658	$34,658
1358754	Retiree	$2,796	69	35					13	$36,348	$36,348
1358812	Retiree	$4,132	72	25					13	$53,716	$53,716
1358842	Retiree	$2,130	68	20					13	$27,690	$27,690
											$241,476

Survival factor = (1 - term rate)^(retirement age - current age); Term Rate = 3%, Retirement Age = 65; Age (See Table)
Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Age), e.g. Age 40 Trend Factor = Product (Year 1 thru 10 Factors) x (1.04)^(65-10-40) Discount = (1 + discount rate)^(current age - retirement age); Discount Rate = 5%, Age (See Table), Retirement Age = 65
Attribution factor = Years of Service/(Retirement Age - (Age - Years of Service)) Active EPBO = claims x annuity x survival x trend x discount; annuity =13 Retiree EPBO = Active EPBO = Claims (a) x Annuity (13)

Survival factor = (1 - term rate)^(retirement age - current age)
Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Age),
e.g. Age 40 Trend Factor = Product (Year 1 thru 10 Factors) x (1.04)^(65-10-40)
Discount = (1 + discount rate)^(current age - retirement age)
Attribution factor = Years of Service/(Retirement Age - (Age - Years of Service))
Active EPBO = claims x annuity x survival x trend x discount;annuity =13
Retiree EPBO = Retiree EPBO = Claims (a) x Annuity (13)
Aggregate APBO = Active APBO + Retiree APBO = **$241,476**

Part b:

Source(s):

Question: (i) Calculate the difference between your detailed approach in part (a) and your supervisor's approach. Show your work. (ii) Explain the main drivers of the difference between your supervisor's approximation and your calculation.(iii) Describe factors unaccounted for in your valuation that may still lead to your APBO calculation being overly simplistic.

SOA Commentary on Question:

This question tested a candidates knowledge of calculating APBO using a simplified, averaging approach in a situation where a detailed approach is not possible. Many candidates neglected to calculate the average for the active population separately before combining with the retiree. Candidates also struggled with explaining drivers of the differences in calculations particularly the skewing of claims and attribution factors as a result of averaging. Most candidates were able to identify some factors unaccounted for in the valuation

SOA Answer:

(i)

	Count	Avg Claim	Avg Age	Avg YoS	Survival	Trend	Discount	Attribution	Annuity	APBO
Active	7	$3,192	44	13	0.5206	2.5254	0.3515	0.3827	13	$51,387
Retiree	5	$3,018	68						13	$196,144
			Detailed averages		0.5312	2.6045	0.3703	0.3748		$247,531
										$6,054
										2.5%

Claims, Age, YoS = Average of Actives (From Table)
Survival Factor = (1 - term rate)^(retirement age – Avg. Age)
Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Avg. Age)
Discount = (1 + discount rate)^(Avg. Age - retirement age)
Attribution factor = Years of Service/(Retirement Age - (Avg. Age – Avg. YoS)

Retiree APBO = $196,144 (Calc. in Part a)
Simplified APBO = Simplified Active APBO + Retiree APBO = $247,531
Difference = Simplified APBO – Detailed APBO (Part A)
Difference = $247,531 – $241,476 = $6,054 (2.5% Difference)

(ii)

- The difference is due to the active APBO only (Retiree APBO is the same using either approach)
- The simplified approach results in a higher average attribution factor than the detailed approach
- The 35 year old high cost claimant skews the average claims resulting in a higher APBO under the simplified approach

(iii)

- Averages will skew differently than applying decrements to individuals
- Mortality will vary by age and gender
- Assumptions may vary for different retiree groups (Medicare vs. Non)
- Retirement rates may vary by age and service, depending on eligibility
- Retiree benefit levels may vary (e.g. grandfathered plans, pre-1990 plans, and closed groups)

Part c:

Source(s):
Question: (i) Explain the difference between the service cost and interest cost components of the NPPBC.(ii) Calculate the total aggregate NPPBC and the difference from your supervisor's estimate. Show your work.

SOA Commentary on Question:
Performance was mixed on this part of the question. Most candidates were able to recall formulas for NPPBC, service cost, and interest cost. Candidates were more successful calculate NPPBC under the detailed approach. Very few candidates got full credit by properly calculating the supervisor NPPBC and difference.

SOA Answer:

See the accompanying Excel file for a detailed solution.

4. Spring 2023 VR #6a-b,d

Part a:

Source(s):

Question: Describe the accounting treatment(s) applied to the recognition of the plan change for the Accumulated Postretirement Benefit Obligation (APBO) and Net Periodic Postretirement Benefit Cost (NPPBC). (i) For active employees (ii) For retired employees

SOA Commentary on Question:

Candidates generally performed well on this part of the question. Not all of the parts in the answer were needed to receive full credit. If a candidate simply listed formulas for APBO or NPPBC, they did not receive credit.

SOA Answer:

(i) This plan change would be a settlement for the active employees because it's a transaction that eliminates all future obligation with respect to the benefit plan. This settlement will reduce the APBO. This will be measured at the date at which the event occurs. The maximum gain or loss recognized in the NPPBC is unrecognized net gain or loss plus any remaining transition asset. Maximum amount is recognized if entire APBO is settled.

(ii) The change for retired employees is considered a prior service cost because it is considered a change in plan amendments. The prior service cost is negative, so it reduces the APBO. This change will be recognized at the date the event occurs. The change will be recognized in NPPBC over future service of participants. In this case, since all participants are retired, recognized over remaining life expectancy. Since Plan terminates in three years, recognize over three years.

Note: this event is not a curtailment because this affects retirees, not active plan participants.

Part b:

Source(s):

Question: Calculate the APBO as of January 1, 20X1 under the new plan. Show your work.

SOA Commentary on Question:

Candidates generally did well on this question. Claims were assumed to be paid out, and therefore trended and discounted at the mid-year; however, if a candidate stated they assumed either end of year or beginning of year claims payment and discounted accordingly, they would receive full credit. Common issues included forgetting to consider the spouses or incorrectly trending or discounting claims. Some candidates also calculated the APBO for active employees, which was not appropriate in this situation.

SOA Answer:

Actives are excluded due to the settlement therefore the APBO is only calculated for the retirees over the next 3 years.

		(a)	(b)	(c)	(d)
		Claims Cost		Claims Cost	
Status	Age	20X0	20X1	20X2	20X3
Retiree	70	$3,250	$3,461	$3,686	$3,926
Spouse	65	$2,800	$2,982	$3,176	$3,382
Retiree	70	$3,250	$3,461	$3,686	$3,926
Retiree	80	$4,250	$4,526	$4,820	$5,134
			= (a) * (1.065)	= (b) * (1.065)	= (c) * (1.065)

		(a)	(e)	(f)	(g)	(h)	(i)
		Claims Cost	Discounted Claims Cost				
Status	Age	20X0	20X1	20X2	20X3	Total	Headcount
Retiree	70	$3,250	$3,378	$3,426	$3,475	$10,279	45
Spouse	65	$2,800	$2,910	$2,952	$2,994	$8,856	45
Retiree	70	$3,250	$3,378	$3,426	$3,475	$10,279	33
Retiree	80	$4,250	$4,417	$4,480	$4,544	$13,442	76
			= (b) * (j)	= (c) * (k)	= (g) * (l)	= (e) + (f) + (g)	

Discount Factor (Assumes Mid-Year Payment)

(j)	(k)	(l)
20X1	20X2	20X3
0.9759	0.9294	0.8852

Total PV of Benefits @ 1/1/20X1 (Retiree APBO)

$2,221,836

= SUMPRODUCT((h) , (i))

Part d:

Source(s): CP321-107-25 – Health Insurance Accounting Basics

Question: (i) Compare and contrast the various approaches the team could use to measure the liabilities under US GAAP. (ii) Recommend an approach for preparing the financial statements. Justify your response.

SOA Commentary on Question:

Candidates did not realize they needed to consider different methods to measure liabilities for an international company instead of just a US GAAP approach, since Oculus was being acquired by a company based in a different country. For the 2nd part of the question, credit was given to candidates for providing a reasonable recommendation and justifying it, even if they did not receive all points for part (i) . Full credit was given for recommending either approach described in part (i) or IFRS.

SOA Answer:

(i)

a. General Model or Building Block Approach measures liabilities with fulfillment cash flows for a group of insurance contracts. Segmented contracts into portfolios of similar risks which are managed together. The building blocks of the fulfillment cash flows are based on the boundary of the contract, the impact of discounting, and explicit risk adjustment. Fourth block is the contractual service margin. Similar to US GAAP in use of current estimates, aggregation of contracts for valuation, market interest rates, and insurance liability instead of investment yields. Difference is the introduction of the CSM and explicit risk adjustment.
b. Premium Allocation Approach, resembles short-duration US GAAP, unearned premium reserve net of acquisition costs and premiums not yet received, separate liability for incurred claims. Can establish a PDR. Difference in liability reflection: must include risk adjustment to reflect compensation required for bearing uncertainty around timing and amount of cash flows. Liabilities are discounted (TVoM) unless receivable inside of 1 year from date of claims incurral.
c. Additional credit was awarded to candidates who mentioned the variable fee approach and that it is not applicable.

(ii)

a. Partial credit was awarded to candidate who recommended either approach and provided a thoughtful justification, even if it was not one of the approaches in part (i).
b. Full credit was awarded for recommending and justifying either of the approaches mentioned above.

5. Fall 2023 VR #5

Part (i) – (iv):

Source(s):

Question: Calculate the following for an employee, hired at age 35, and currently age 45. Show your work. (i) EPBO (ii) APBO (iii) Service Cost (iv) Interest Cost

SOA Commentary on Question:

Some candidates did not recognize that the benefit amount needs to be multiplied by the number of years of service beyond age 40. Another common issue was that termination stopped at age 60 that was commonly missed.

SOA Answer:

See the accompanying Excel file for a full solution

6. Spring 2024 VR #8

Part a:

Source(s):

Question: List the reasons why an employer would offer a retiree medical group benefits program.

SOA Commentary on Question:

All candidates did well on this section. Most had the list memorized.

SOA Answer:

1. Provides a tax effective way of providing financial security for retirees
2. Cash costs are nominal compared to overall spending on benefits.
3. Often top of the list of union demands.
4. It is the social responsibility of the employer to provide retirees with continued health coverage.
5. Creates a more competitive overall compensation package.
6. Helps with workforce planning and provides growth opportunities for employees.
7. It is a useful benefit for those retired or who are soon to retire.

Part b:

Source(s):

Question: Calculate the annual expected out-of-pocket costs for each of the two retirees under each of the three plan options. Show your work.

SOA Commentary on Question:

There was a lot of confusion over what a Medigap policy covers and what Medicare Advantage covers. The deductible was applied incorrectly in many cases. There were some candidates that did understand and got full credit. On average candidates received about half the points available.

SOA Answer:

Please see the Excel workbook for the correct solution.

Part c:

Source(s):

Question: Recommend a plan option for each retiree based on the results of part (b).

SOA Commentary on Question:

This was a tricky question. If the candidate managed to calculate the correct out of pocket expenses in Part B, it would reveal that Medigap Plan F had the lowest out of pocket expenses of zero because Plan F covers everything. However, due to the MACRA changes in 2020, Plan F is not available to newly eligible Medicare participants. If the candidate did not read or remember this and recommended Plan F for either member, they lost all points for that recommendation. Partial credit was given to candidates who made a correct recommendation using an incorrect calculation in Part B.

SOA Answer:

For Retiree A, I'd recommend Medigap Plan G because it has rich benefits, and Retiree A is less healthy and will likely be needing those benefits. Although Plan F is even richer, the MACRA legislation makes it so Plan F can no longer be sold to people newly eligible for Medicare.

For Retiree B, I'd recommend the Medicare Advantage plan because its benefits are leaner, so its premium would be lower. Retiree B is healthy and can take advantage of those lower premiums while also having sufficient health care for their situation.

Part d:

Source(s): ASOP #21 – Responding to Financial Audits

Question: Calculate the monthly subsidy amount such that the total out-of-pocket cost (including premiums) to XYZ's retirees will be the same as under the current traditional plan. Show your work.

SOA Commentary on Question:

Candidates struggled with this question. Partial credit was awarded for correctly calculating total out of pocket expenses, recognizing the current cost, mentioning the minimum subsidy amount and other factors. On average, only about 25% of the available points were awarded.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.

7. Fall 2024 DP #9

Part a:

Source(s): CIA Educational Note – Health Care Trend Rate

Question: List healthcare assumptions used to calculate the Accumulated Postretirement Benefit Obligation (APBO) and Service Cost.

SOA Commentary on Question:

Candidates did not perform well on this question. The question specifically asked for healthcare assumptions. Long-term assumptions such as termination or salary escalation did not receive credit.

SOA Answer:

1. Per-capita claims costs
2. Health plan inflation/trend rates
3. Administration expenses
4. Medicare offset considerations
5. Medical cost aging assumptions

Part b:

Source(s): CP321-111-25 – IAS19

Question: (i) Recommend Plan 1 or Plan 2 based on DEF's objectives under: Trend Scenario #1 and Trend Scenario #2. Show your work. Justify your responses. (ii) Evaluate the risk of using Trend Scenario #2.

SOA Commentary on Question:

Few candidates received full credit to this question.

b(i): The question tested the candidates understanding of EPBO, APBO, and service cost. Few candidates identified the difference between balance sheet requirement (APBO is liability) vs. income statement requirement (service cost is expense).

b(ii): Candidates received full credit for identifying the trend differences and indicating the misestimation risk may result in unfavorable financial impact as well as poor plan selection. Other reasonable responses also received full credit.

SOA Answer:

The model solution for this part is in the accompanying Excel spreadsheet.