

1. Bruce deposits 100 into a bank account. His account is credited interest at a nominal rate of interest i convertible semiannually.

At the same time, Peter deposits 100 into a separate account. Peter's account is credited interest at a force of interest of δ .

After 7.25 years, the value of each account is 200.

Calculate $(i - \delta)$.

- (A) 0.12%
- (B) 0.23%
- (C) 0.31%
- (D) 0.39%
- (E) 0.47%

2. Suppose the required reserve ratio for commercial banks is 10%. Further suppose that the central bank, through open market operations, purchases 1 billion in U.S. government securities from commercial banks.

As a result of this action, the potential amount of increase in checkable deposits in the banking system will:

- (A) increase by 10 billion.
- (B) increase by 1.1 billion.
- (C) decrease by 0.9 billion.
- (D) decrease by 1.1 billion.
- (E) decrease by 10 billion.

3. The beta for QRS Life Insurance Company is 0.4, while the beta for the life insurance industry is X . The risk-free rate of interest is 4% and the market return is 14%.

The expected return on QRS stock minus the expected return for the industry is 0.5%.

Calculate X .

- (A) -0.10
- (B) 0.10
- (C) 0.25
- (D) 0.35
- (E) 0.45

4. XYZ Company produces paper used to manufacture corrugated boxes. XYZ has available to it a fixed labor force of 2000 person-hours per day, employed under a long-term contract at 10 per hour. It operates with excess machine capacity and can produce paper with a labor allocation of 8 hours per ton of paper. It can deliver paper with a labor allocation of 2 hours per ton of paper delivered. XYZ receives a price for paper of 110 per ton delivered to the corrugated manufacturer.

XYZ is considering a contract with a shipping firm, who would ship all of XYZ's paper.

Calculate the maximum amount XYZ could pay to subcontract its delivery without reducing profit.

- (A) 2000
- (B) 4000
- (C) 5000
- (D) 5500
- (E) 7500

5. A machine is purchased for 5000 and has a salvage value of S at the end of 10 years. The machine is depreciated using the sum-of-the-years-digits method.

At the end of year 4, the machine has a book value of 2218 . At that time, the depreciation method is changed to the straight-line method for the remaining years.

Determine the new depreciation charge for year 8.

- (A) 200
- (B) 222
- (C) 286
- (D) 370
- (E) 464

6. An increase in income shifts the demand curve for sailboats.

In the short run, what will be the most likely result of this shift?

- (A) Higher prices
- (B) Lower prices
- (C) An upward shift in the supply curve
- (D) A downward shift in the supply curve
- (E) A lower output

7. A firm has the following capital structure:

	Market Value
Debt	5,000
Equity	10,000
Total	15,000

Current Share Price: 50

Expected Earnings Per Share (EPS): 6

Cost of New Debt: 5%

The firm would like to issue new debt and use the proceeds to repurchase equity.

Using the assumptions in Modigliani and Miller's Proposition I, determine the amount of new debt the firm must issue to achieve an expected ROE of 15% .

- (A) 2000
- (B) 3000
- (C) 4000
- (D) 5000
- (E) 6000

8. Kathryn deposits 100 into an account at the beginning of each 4-year period for 40 years. The account credits interest at an annual effective interest rate of i .

The accumulated amount in the account at the end of 40 years is X , which is 5 times the accumulated amount in the account at the end of 20 years.

Calculate X .

- (A) 4695
- (B) 5070
- (C) 5445
- (D) 5820
- (E) 6195

9. You are given the following data for Country X:

Exports	200
Imports	250
Income received	50
Income paid	100
Increase in Country X holdings of foreign assets	350
Increase in foreign holdings of Country X assets	450

Calculate the Capital Account Balance for Country X.

- (A) -100
- (B) -50
- (C) +50
- (D) +100
- (E) +200

10. Consumers view fish and beef as substitutes. Suppose that medical studies show that eating fish substantially reduces the risk of certain types of cancer.

What effects will this information have on the prices of fish and beef and the quantities consumed of each commodity?

- (A) The price of fish will decrease, and the quantity of fish consumed will decrease. The price of beef will increase, and the quantity of beef consumed will increase.
- (B) The price of fish will decrease, but the quantity of fish consumed will increase. The price of beef will increase, but the quantity of beef consumed will decrease.
- (C) The price of fish will increase, and the quantity of fish consumed will increase. The price of beef will decrease, and the quantity of beef consumed will decrease.
- (D) The price of fish will increase, but the quantity of fish consumed will decrease. The price of beef will decrease, but the quantity of beef consumed will increase.
- (E) The price of fish will increase, and the quantity of fish consumed will increase. The price of beef will increase, but the quantity of beef consumed will decrease.

11. Which of the following statements about portfolio risk are true?

- I. The variability of an investment portfolio that is balanced evenly between two stocks is lower than the average variability of the two individual stocks.
- II. Full diversification of an investment portfolio eliminates market risk.
- III. The total risk of an individual stock held in isolation determines its contribution to the risk of a well-diversified portfolio.

- (A) I only
- (B) III only
- (C) I and II only
- (D) II and III only
- (E) I, II, and III

12. Eric deposits X into a savings account at time 0, which pays interest at a nominal rate of i , compounded semiannually.

Mike deposits $2X$ into a different savings account at time 0, which pays simple interest at an annual rate of i .

Eric and Mike earn the same amount of interest during the last 6 months of the 8th year.

Calculate i .

- (A) 9.06%
- (B) 9.26%
- (C) 9.46%
- (D) 9.66%
- (E) 9.86%

13. In 1991, the United States switched from using Gross National Product (GNP) to using Gross Domestic Product (GDP) to track the level of economic activity.

Which of the following is true regarding GNP and GDP?

- (A) The difference between GNP and GDP is the value of aggregate investment.
- (B) Production in the government sector is valued at the cost of its inputs.
- (C) The overall level of economic activity can be measured by adding the value of output produced to the level of income earned.
- (D) Most other countries use a GNP concept to track economic activity.
- (E) GDP is defined as the market value of all final goods and services produced in a given time period by labor and property of U.S. residents, regardless of where the labor and property are located.

14. The supply and demand functions for a competitive industry are:

$$\text{Demand: } P = 20 - 4Q$$

$$\text{Supply: } P = 10 + Q$$

where P is price and Q is quantity.

Suppose the incomes of consumers change and the new demand function is:

$$\text{Demand: } P' = 30 - 4Q'$$

Calculate the elasticity of supply in moving from the old to the new equilibrium.

- (A) 0.2
- (B) 0.9
- (C) 1.0
- (D) 1.5
- (E) 6.0

15. John borrows 1000 for 10 years at an annual effective interest rate of 10%. He can repay this loan using the amortization method with payments of P at the end of each year. Instead, John repays the 1000 using a sinking fund that pays an annual effective rate of 14%. The deposits to the sinking fund are equal to P minus the interest on the loan and are made at the end of each year for 10 years.

Determine the balance in the sinking fund immediately after repayment of the loan.

- (A) 213
- (B) 218
- (C) 223
- (D) 230
- (E) 237

16. A company is considering purchasing new equipment at a price of 15,000. The purchase would be financed by issuing new common stock that has an underwriting cost of 500. The new equipment is expected to generate cash flows of 2700 at the end of each year for 10 years.

The company's opportunity cost of capital is 12% and its return on equity is 15%.

Determine the company's adjusted present value for this venture.

- (A) -1949
- (B) -1449
- (C) -949
- (D) -244
- (E) 256

17. An association had a fund balance of 75 on January 1 and 60 on December 31. At the end of every month during the year, the association deposited 10 from membership fees. There were withdrawals of 5 on February 28, 25 on June 30, 80 on October 15, and 35 on October 31.

Calculate the dollar-weighted rate of return for the year.

- (A) 9.0%
- (B) 9.5%
- (C) 10.0%
- (D) 10.5%
- (E) 11.0%

18. In 2001, the level of output for a country was 1500. The total factor productivity growth is expected to be 10% between 2001 and 2002. The elasticity of output with respect to capital and labor are projected to be 0.8 and 1.2 respectively in 2002.

The table below shows the actual capital and labor inputs for 2001 along with projected inputs for 2002.

Year	Capital	Labor
2001	800	1200
2002	1000	1100

What is the projected level of output for 2002?

- (A) 1250
- (B) 1500
- (C) 1650
- (D) 1800
- (E) 1975

19. Suppose an actuary is offered a job with an insurance firm for a salary of 150,000 per year. The job also includes pension and insurance benefits worth 25,000 per year. Further suppose that the actuary chooses instead to open her own consulting firm. Her consulting firm bills 275,000 per year, and it has the following costs: 12,500 for supplies, 20,000 for secretarial support, and 70,000 to lease office space and furniture.

Calculate the actuary's annual accounting and economic profit from her consulting firm.

- (A) Accounting profit = 147,500; Economic profit = -2,500
- (B) Accounting profit = 147,500; Economic profit = 22,500
- (C) Accounting profit = 172,500; Economic profit = -2,500
- (D) Accounting profit = 172,500; Economic profit = 22,500
- (E) Accounting profit = 172,500; Economic profit = 277,500

20. Which of the following statements about equity and debt securities are true?

- I. United States law allows corporations to issue different classes of common stock with different voting rights.
- II. The par value of a company's common stock (as entered in the company's books) is generally equal to the amount of money the company receives when first selling the shares to the public.
- III. A bond that is both senior and secured does not pose much risk to the investor.

- (A) I only
- (B) II only
- (C) III only
- (D) I and II only
- (E) II and III only

21. Monitoring is a costly economic activity. In order to lower monitoring costs, manufacturing firms can construct labor contracts such that workers will self-monitor their activities. To do this, Firm J offers its workers “efficiency wages” while Firm K offers its workers wages based on number of units produced.

How does the wage rate at each of the two firms compare to the market equilibrium wage rate?

- (A) Neither firm pays the market equilibrium wage rate.
- (B) Firm J pays above the market equilibrium wage rate, whereas Firm K pays the market equilibrium wage rate.
- (C) Firm J pays below the market equilibrium wage rate, whereas Firm K pays the market equilibrium wage rate.
- (D) Firm J pays the market equilibrium wage rate, whereas Firm K pays below the market equilibrium wage rate.
- (E) Both firms pay the market equilibrium wage rate.

22. A perpetuity costs 77.1 and makes annual payments at the end of the year.

The perpetuity pays 1 at the end of year 2, 2 at the end of year 3, ..., n at the end of year $(n+1)$. After year $(n+1)$, the payments remain constant at n . The annual effective interest rate is 10.5%.

Calculate n .

- (A) 17
- (B) 18
- (C) 19
- (D) 20
- (E) 21

23. You are given the following information about a firm's expected returns and debt:

$$r_{\text{assets}} = 11\%$$

$$r_{\text{debt}} = 7\%$$

$$\text{Debt} = 800$$

$$\beta_{\text{equity}} = 0.9$$

$$\text{Risk-free rate} = 4.5\%$$

$$\text{Market risk premium} = 12.3\%$$

Determine the value of the firm.

- (A) 900
- (B) 1500
- (C) 1720
- (D) 3260
- (E) 7200

24. The IS and LM curves for the economy of country X are as follows:

$$\text{IS: } r = 12 - 2Y$$

$$\text{LM: } r = Y$$

where r is the interest rate in percent and Y is income in trillions.

Now suppose the central bank engages in an expansionary monetary policy while the fiscal authority expands government purchases of goods and services.

According to the IS-LM model, what impact would these policies have?

- (A) The new equilibrium interest rate will be less than 4%, and the new equilibrium level of output will be greater than 4 trillion.
- (B) The new equilibrium interest rate will be greater than 4%, and the new equilibrium level of output will be greater than 4 trillion.
- (C) The new equilibrium interest rate will be less than 4%, but the impact on the equilibrium level of output is ambiguous.
- (D) The impact on the equilibrium interest rate is ambiguous, but the new equilibrium level of output will be greater than 4 trillion.
- (E) The impact on both the equilibrium interest rate and level of output is ambiguous.

25. Which of the following are real options found in capital investment projects?

I. A call option to make follow-on investments

II. A call option to wait before investing

III. A call option to abandon

(A) I only

(B) II only

(C) I and II only

(D) I and III only

(E) II and III only

26. 1000 is deposited into Fund X, which earns an annual effective rate of 6%. At the end of each year, the interest earned plus an additional 100 is withdrawn from the fund. At the end of the tenth year, the fund is depleted.

The annual withdrawals of interest and principal are deposited into Fund Y, which earns an annual effective rate of 9%.

Determine the accumulated value of Fund Y at the end of year 10.

- (A) 1519
- (B) 1819
- (C) 2085
- (D) 2273
- (E) 2431

27. Consider the following forecasted long-run average cost (AC) curve for a representative firm in a contestable market:

$$AC = Q + \left(\frac{25}{Q} \right)$$

Suppose that the market demand function is:

$$P = 50 - 4Q$$

where P is price and Q is quantity.

How many identical firms will this market support?

- (A) 0
- (B) 1
- (C) 2
- (D) 5
- (E) 10

28. You are given the following information about a firm:

Proportion of the firm's book value related to debt: 20%

Proportion of the firm's book value related to equity: 80%

Expected return on the firm's debt: 10%

Expected return on the firm's equity: 15%

$$\beta_{\text{asset}} = 0.78$$

$$\beta_{\text{debt}} = 0.30$$

$$\beta_{\text{equity}} = 1.50$$

Calculate the firm's cost of capital.

(A) 11%

(B) 12%

(C) 13%

(D) 14%

(E) 15%

29. Suppose that the quantity theory of money is an adequate description of the economy. Further suppose that velocity rises at 2% per year and output increases by 4%. Let M denote the rate of change in the money supply.

Determine the values of M that will keep inflation between 1% and 2% per year.

- (A) $-1\% \leq M \leq 0\%$
- (B) $0\% \leq M \leq 1\%$
- (C) $1\% \leq M \leq 2\%$
- (D) $2\% \leq M \leq 3\%$
- (E) $3\% \leq M \leq 4\%$

30. You are given the following table of interest rates:

Calendar Year of Original Investment	Investment Year Rates (in %)					Portfolio Rates (in %)
	i_1^y	i_2^y	i_3^y	i_4^y	i_5^y	
1992	8.25	8.25	8.4	8.5	8.5	8.35
1993	8.5	8.7	8.75	8.9	9.0	8.6
1994	9.0	9.0	9.1	9.1	9.2	8.85
1995	9.0	9.1	9.2	9.3	9.4	9.1
1996	9.25	9.35	9.5	9.55	9.6	9.35
1997	9.5	9.5	9.6	9.7	9.7	
1998	10.0	10.0	9.9	9.8		
1999	10.0	9.8	9.7			
2000	9.5	9.5				
2001	9.0					

A person deposits 1000 on January 1, 1997. Let the following be the accumulated value of the 1000 on January 1, 2000:

- P : under the investment year method
 Q : under the portfolio yield method
 R : where the balance is withdrawn at the end of every year and is reinvested at the new money rate

Determine the ranking of P , Q , and R .

- (A) $P > Q > R$
 (B) $P > R > Q$
 (C) $Q > P > R$
 (D) $R > P > Q$
 (E) $R > Q > P$

31. Which of the following are advantages of Arbitrage Pricing Theory (APT) over the Capital Asset Pricing Model?

- I. APT does not need a market portfolio.
- II. The risk factors are dictated by the design of APT.
- III. APT has a simpler mathematical structure.

- (A) I only
- (B) II only
- (C) I and II only
- (D) I and III only
- (E) II and III only

32. Suppose that a consumer's income decreases and, at the same time, the price of X decreases. Further suppose that a consumer purchases less X than he did at the previous price and income levels.

Given the observed change in consumption in response to the price and income changes, which of the following is true?

- (A) X must be a normal good.
- (B) X must be a non-Giffen inferior good.
- (C) X must be a Giffen good.
- (D) X could be either normal or non-Giffen inferior.
- (E) X could be either normal or Giffen.

33. At an annual effective interest rate of i , $i > 0$, both of the following annuities have a present value of X :

- (i) a 20-year annuity-immediate with annual payments of 55
- (ii) a 30-year annuity-immediate with annual payments that pays 30 per year for the first 10 years, 60 per year for the second 10 years, and 90 per year for the final 10 years

Calculate X .

- (A) 575
- (B) 585
- (C) 595
- (D) 605
- (E) 615

34. You are given:

- (i) Personal tax rate on interest = $T_p = 38\%$.
- (ii) Effective personal tax rate on equity income = $T_{pE} = 38\%$.
- (iii) Tax rate on capital gains = 28% .
- (iv) Corporate tax rate = 35% .

Determine the relative tax advantage of debt, using the Modigliani and Miller model.

- (A) 1.00
- (B) 1.32
- (C) 1.39
- (D) 1.54
- (E) 1.69

35. Which of the following statements about common goods and public property are true?

- I. Private markets fail to produce nonexcludable goods in socially efficient quantities because of the free riding problem.
- II. An admission fee to discourage overuse of common property is a form of Pigou tax.
- III. A Clarke tax produces information about the value that the public places on a public good.

- (A) II only
- (B) I and II only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III

36. Eric and Jason each sell a different stock short at the beginning of the year for a price of 800 . The margin requirement for each investor is 50% and each will earn an annual effective interest rate of 8% on his margin account.

Each stock pays a dividend of 16 at the end of the year. Immediately thereafter, Eric buys back his stock at a price of $(800 - 2X)$, and Jason buys back his stock at a price of $(800 + X)$.

Eric's annual effective yield, i , on the short sale is twice Jason's annual effective yield.

Calculate i .

- (A) 4%
- (B) 6%
- (C) 8%
- (D) 10%
- (E) 12%

37. A company's dividend per share is expected to grow indefinitely at a rate of 6% per year. Suppose the current stock price is 600 and the next annual dividend, payable one year from now, is 20. Assume that the opportunity cost of capital is constant.

John, Bill, and Fred each invest in the company. John invests for one year, Bill invests for two years, and Fred invests for three years.

Who expects the highest annualized rate of return?

- (A) John
- (B) Bill
- (C) Fred
- (D) John, Bill, and Fred all have the same expected rate of return.
- (E) Not enough information is given here to answer the question.

38. Suppose that the central bank is targeting real output growth. Further suppose that the central bank has decided to lower the discount rate.

What does this information suggest about the business cycle and the actions taken on the part of the central bank?

- (A) The economy is in a contractionary phase of the business cycle, and the central bank would be purchasing bonds through open market operations.
- (B) The economy is in a contractionary phase of the business cycle, and the central bank would be raising the required reserve ratio.
- (C) The economy is in a contractionary phase of the business cycle, and the central bank would be selling bonds on the open market.
- (D) The economy is in an expansionary phase of the business cycle, and the central bank would be purchasing bonds through open market operations.
- (E) The economy is in an expansionary phase of the business cycle, and the central bank would be selling bonds on the open market.

39. A 30-year loan of 1000 is repaid with payments at the end of each year.

Each of the first ten payments equals the amount of interest due. Each of the next ten payments equals 150% of the amount of interest due. Each of the last ten payments is X .

The lender charges interest at an annual effective rate of 10%.

Calculate X .

- (A) 32
- (B) 57
- (C) 70
- (D) 97
- (E) 117

40. You are interested in purchasing a call option on a common stock that is currently trading at a price of 122 per share. You are given the following information:

(i) the standard deviation of the continuously compounded annual rate of return on the stock is 0.2

(ii) the time to maturity of the call is 1 year

(iii)
$$\ln\left(\frac{\text{Current Stock Price}}{\text{Present Value of the Exercise Price}}\right) = 0.2$$

Calculate the price of each call option using Black-Scholes.

(A) 13

(B) 15

(C) 19

(D) 21

(E) 24

41. Suppose X is exchanged in a competitive market, and the supply and demand functions for X are as follows:

$$\begin{array}{ll} \text{Supply:} & Q = 25 + 5P \\ \text{Demand:} & Q = 100 - 5P \end{array}$$

where P is price and Q is quantity.

Now suppose that an excise tax of 5.0 per unit is placed on sales of X.

How much tax revenue will be raised in this market?

- (A) 125.0
- (B) 187.5
- (C) 250.0
- (D) 312.5
- (E) 375.0

42. A 10,000 par value 10-year bond with 8% annual coupons is bought at a premium to yield an annual effective rate of 6%.

Calculate the interest portion of the 7th coupon.

- (A) 632
- (B) 642
- (C) 651
- (D) 660
- (E) 667

43. Which of the following statements about efficient markets are true?

- I. In the strong form of the efficient market theory, prices reflect all public information.
- II. In an efficient market, a portfolio manager is not expected to consistently outperform the market.
- III. In the weak form of the efficient market theory, prices reflect all information contained in the record of past prices.

- (A) I only
- (B) I and II only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III

44. A product is offered in a perfectly competitive market. The market supply and demand functions for the product are as follows:

$$\begin{aligned}\text{Supply:} & \quad P = 10 + Q \\ \text{Demand:} & \quad P = 5 - Q\end{aligned}$$

where P is price and Q is quantity.

The industry for this product is composed of 100 identical firms, each with the following marginal cost function and no fixed costs:

$$MC = 10 + 100q$$

where MC is marginal cost, and q is the quantity produced by the firm.

Calculate the output for the typical firm.

- (A) 0
- (B) 1
- (C) 2
- (D) 3
- (E) 5

45. A perpetuity-immediate pays 100 per year. Immediately after the fifth payment, the perpetuity is exchanged for a 25-year annuity-immediate that will pay X at the end of the first year. Each subsequent annual payment will be 8% greater than the preceding payment.

Immediately after the 10th payment of the 25-year annuity, the annuity will be exchanged for a perpetuity-immediate paying Y per year.

The annual effective rate of interest is 8%.

Calculate Y .

- (A) 110
- (B) 120
- (C) 130
- (D) 140
- (E) 150

46. A company's inventory has risen by 100,000 over the last quarter, but its other current assets have remained constant. Its current liabilities have also remained the same over the last quarter.

How will its current ratio and quick ratio change from the previous quarter?

- (A) Both will go up.
- (B) Both will go down.
- (C) Neither ratio will change.
- (D) The current ratio goes up, but the quick ratio goes down.
- (E) The current ratio goes up, but the quick ratio does not change.

47. Suppose that the federal authorities of country X control the central bank and adhere to a fixed exchange rate policy. Further suppose that the authorities choose to put downward pressure on interest rates and simultaneously depreciate the exchange rate.

What effect will these policies have on the components of aggregate demand in the Keynesian model?

- (A) Investment will increase, but net exports will decrease.
- (B) Investment will increase, and net exports will increase.
- (C) Investment will decrease, and net exports will decrease.
- (D) Investment will decrease, but net exports will increase.
- (E) The impact on investment is ambiguous, and the impact on net exports is ambiguous.

48. The price elasticity of demand for X is -0.75 . Due to an increase in the cost of producing X, the equilibrium price of X increases by 3%.

Calculate the percentage change in the quantity of X exchanged in the market.

- (A) -4.00%
- (B) -2.25%
- (C) -0.25%
- (D) $+2.25\%$
- (E) $+4.00\%$

49. Which of the following statements about capital structure are true?

- I. According to Lintner's model, managers focus more on the absolute levels of dividends than on dividend changes.
- II. According to Modigliani and Miller, in a perfect world, a company's dividend policy is irrelevant.
- III. A company that repurchases shares is typically optimistic about the future.

- (A) II only
- (B) I and II only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III

50. Jeff deposits 10 into a fund today and 20 fifteen years later. Interest is credited at a nominal discount rate of d compounded quarterly for the first 10 years, and at a nominal interest rate of 6% compounded semiannually thereafter. The accumulated balance in the fund at the end of 30 years is 100.

Calculate d .

- (A) 4.33%
- (B) 4.43%
- (C) 4.53%
- (D) 4.63%
- (E) 4.73%