Course 2
May 2003
Answer Key

1.	B	26.	C
2.	A	27.	C
3.	D	28.	B
4.	D	29.	E
5.	C	30.	D
6.	A	31.	A
7.	B	32.	E
8.	E	33.	A
9.	D	34.	D
10.	C	35.	C or E*
11.	A	36.	B
12.	C	37.	D
13.	B	38.	A
14.	E	39.	D
15.	A	40.	E
16.	D	41.	C
17.	E	42.	B
18.	D	43.	E
19.	C	44.	A
20.	A	45.	C
21.	B	46.	E
22.	C	47.	A or B*
23.	B	48.	B
24.	D	49.	D
25.	C	50.	C

*Either response was scored correct.

1. Solution: B

For Bruce: $\left(1+\dfrac{i}{2}\right)^{(7.25)(2)} = \left(1+\dfrac{i}{2}\right)^{14.5} = 2 \Rightarrow i = 9.79\%$

For Peter: $e^{7.25\delta} = 2$;

$$\delta = \dfrac{\ln \cdot 2}{7.25} = 9.56\%$$

$\therefore (i-\delta) = 9.79\% - 9.56\% = 0.23\%$

2. Solution: A

The increase in checkable deposits equals the increase in reserves divided by the required reserve ratio. $1 \text{ billion}/0.10 = 10 \text{ billion}$

3. Solution: D

$$0.4(0.1) - X(0.1) = 0.005$$
$$0.04 - 0.005 = X(0.1)$$
$$X = 0.35 .$$

4.   Solution: D

Before delivery is outsourced, XYZ can produce 200 tons of paper per day, calculated as $2000 \text{ hours } \times (8/10)/8 \text{ hours per ton} = 200$, where $8/10$ represents the percentage of hours that must be devoted to manufacturing.

   After outsourcing delivery, XYZ can produce $250 (= 2000/8)$ tons per day.

The difference in revenue is $5500 (= 50 \times 110)$.

5.   Solution: C

$$(5000 - x) \times \frac{10 + 9 + 8 + 7}{55} = (5000 - 2218)$$
$$x = 500$$
$$\frac{2218 - 500}{6} = 286.33$$

6.   Solution: A

An increase in income shifts the demand curve upward, which raises output and prices.

7.   Solution: B

Current ROE $= 6/50 = 12\%$
shares outstanding $= 10,000/50 = 200$
Total expected earnings $= 200(6) = 1200$
Define D $=$ amount of new debt
Then $(1200 - 0.5 \text{ D})/(10,000 - \text{D}) = 15\%$. Thus D $= 3000$

8.   Solution: E

$$\text{End of year } 40 = 100 \cdot \frac{s_{\overline{40|}}}{a_{\overline{4|}}} = X$$

$$\text{End of year } 20 = 100 \cdot \frac{s_{\overline{20|}}}{a_{\overline{4|}}}$$

$$100 \cdot \frac{s_{\overline{40|}}}{a_{\overline{4|}}} = 100 s_{\overline{20|}} \frac{\left[(1+i)^{20} + 1\right]}{a_{\overline{4|}}} = \frac{100 \cdot s_{\overline{20|}}}{a_{\overline{4|}}} (5)$$

$$(1+i)^{20} = 4 \Rightarrow i = 7.1773\%$$

$$X = 100 \cdot \frac{s_{\overline{40|}\,i}}{a_{\overline{4|}\,i}} = 6195$$

9.   Solution: D

The Capital Account balance equals the increase in foreign holdings of Country X assets minus the increase in Country X holdings of foreign assets. In this case, 450 units minus 350 units equals + 100 units.

10.   Solution: C

The news releases would most likely bring about an increase in the tastes and preferences, and hence the demand, for fish and a decrease in the demand for beef. This would lead to an increase in the price of fish and the quantity of fish consumed, and it would lead to a decrease in the price and quantity of beef.

11.   Solution: A

I. is true.
Diversification reduces variability by lowering unique risk.

12.   Solution: C

Eric's interest, last 6 months: $X\left(1+\dfrac{i}{2}\right)^{15}\cdot\left(1+\dfrac{i}{2}-1\right)$

$$= X\left(1+\dfrac{i}{2}\right)^{15}\cdot\dfrac{i}{2}$$

Mike's interest, last 6 months: $2X\cdot\dfrac{i}{2}$

$$\therefore X\left(1+\dfrac{i}{2}\right)^{15}\cdot\dfrac{i}{2} = 2X\cdot\dfrac{i}{2} \Rightarrow \left(1+\dfrac{i}{2}\right)^{15} = 2 \Rightarrow i = 9.46\%$$

13.   Solution: B

It is not possible to value government sector output at its market price because there is not a marketplace where these goods and services are sold. Therefore, production in the government sector is valued at the cost of its inputs.

14.   Solution: E

By definition, the elasticity of supply is $(dQ/dP)\times(P/Q)$. Substitution yields:
$1\times(12/2) = 6$.

15. Solution: A

$a_{\overline{10}|} = 6.14457$

The payment using the amortization method $= 10,000 / 6.14457 = 162.745$.

The interest $= 1000 * 0.1 = 100$

Deposits into the sinking fund $= 162.745 - 100 = 62.745$

$s_{\overline{10}|0.14} = 19.3373$

$62.745 * 19.3373 = 1213.319$

$1213.319 - 1000 = 213.319$

16. Solution: D

NPV = −15,000 initially and 2,700 for 10 years @ 12%
= +255.602

APV = +255.602 minus underwriting costs of 500 = −244.398
(or NPV = APV = −15,500 initially and +2,700 for 10 years @12%)

17. Solution: E

total deposits = 120

total withdrawals = 145

Investment income $= 60 + 145 - 120 - 75 = 10$

$$\text{Rate of return} = \frac{10}{75 + \left(\frac{1}{12} + \cdots + \frac{11}{12}\right) \cdot 10 - \frac{10}{12} 5 - \frac{6}{12} 25 - \frac{2.5}{12} 80 - \frac{2}{12} 35}$$

$= 10/90.833 = 11\%$

18.   Solution: D

$$\frac{\Delta Y}{Y} = \alpha_k \frac{\Delta K}{K} + \alpha_N \frac{\Delta N}{N} + \frac{\Delta A}{A}$$

$$\frac{Y - 1500}{1500} = 0.8 \times \frac{(1000 - 800)}{800} + 1.2 \frac{(1100 - 1200)}{1200} + 0.10 = 0.20$$

$$\Rightarrow Y = 1500 \times (1.2) = 1800$$

19.   Solution: C

Accounting profit is total revenue less accounting costs:
$275,000 - 12,500 - 20,000 - 70,000 = 172,500$.
Economic profit is total revenue less accounting costs less opportunity costs. Hence economic profit is $275,000 - 102,500 - 175,000 = -2,500$.

20.   Solution: A

I is true.
II is false because in general, the par value of common stock is set very low, often at \$1 .
III is false because the risk is a function of the riskyness of the issuing firm's assets. A bond secured by risky assets is still risky.

21.   Solution: B

Efficiency wages are above equilibrium in order to induce workers to self-monitor; however, since they are above equilibrium, there are more workers seeking work at the efficiency rate than there are jobs at that rate. Workers working for a rate based on production receive their marginal products—i.e. the equilibrium wage—and since they only get paid for what they do, they self-monitor.

22.   Solution: C

$$\text{Cost of the perpetuity} = v \cdot (Ia)_{\overline{n}|} + \frac{n \cdot v^{n+1}}{i}$$

$$= v \cdot \left[\frac{\ddot{a}_{\overline{n}|} - nv^n}{i} \right] + \frac{n \cdot v^{n+1}}{i}$$

$$= \frac{a_{\overline{n}|}}{i} - \frac{nv^{n+1}}{i} + \frac{nv^{n+1}}{i}$$

$$= \frac{a_{\overline{n}|}}{i}$$

Since $i = 10.5\%$,

$$\frac{a_{\overline{n}|}}{i} = \frac{a_{\overline{n}|}}{0.105} = 77.10 \Rightarrow a_{\overline{n}|} = 8.0955, \text{ at } 10.5\%$$

$$\therefore n = 19$$

23.   Solution: B

$$r_{\text{equity}} = r_{\text{f}} + \beta_{\text{equity}} (\text{market risk premium}) = 4.5\% + 0.9(12.3\%) = 15.57\%$$

$$r_{\text{assets}} = X \cdot r_{\text{debt}} + (1 - X) \cdot r_{\text{equity}}$$

$$11\% = X \cdot 7\% + (1 - X) \cdot 15.57\%$$

$$-4.57\% = -8.57\% \cdot X$$

$$X = 0.533$$

$$X = \frac{D}{V}; \quad X = 0.533 = \frac{800}{V}; \quad V = 1500$$

24.   Solution: D

An expansionary monetary policy will shift the LM curve to the right – i.e. it will decrease the R intercept in the LM function. An expansionary fiscal policy will shift the IS curve to the right – i.e. it will increase the R intercept in the IS function. Together, these two policies will unambiguously increase output, but the impact on interest rates is ambiguous.

25.   Solution: C

I and II are real options.
Statement III is false—an option to abandon is a put option, not a call option

26.   Solution: C

$$6(Ds)_{\overline{10}|0.09} + 100\ s_{\overline{10}|0.09}$$

$$6\left(\frac{10(1.09)^{10} - s_{\overline{10}|0.09}}{0.09}\right) + 100(15.19293)$$

$$565.38 + 1519.29$$

$$2084.67$$

27.   Solution: C

In a contestable market, the minimum point of the average cost function corresponds with price in the long run; therefore price will equal 10, and the representative firm will produce 5 units. However, at a price of 10, the quantity demanded is 10; so this market can support two identical firms.

28.   Solution: B

The split of the firm's market value between debt and equity is determined using the beta data.

$$\beta_{asset} = \beta_{debt} * \text{ debt proportion of value } + \beta_{equity} * \text{ equity proportion of value,}$$

where the debt and equity weights equal 1.0 . This yields a debt weight of 60% and an equity weight of 40%.

Then the expected returns for the debt and equity components are weighted to yield the cost of capital. Thus, $0.60*0.10 + 0.40*0.15 = 0.12$.

29.   Solution: E

The quantity theory of money states that % change money (M) + % change Velocity (V) = % change in prices (P) + % change in output (Y). Y = 4, V = 2 and $1 \le P \le 2$. Hence, $3 \le M \le 4$.

30.   Solution: D

$$P = 1000(1.095)(1.095)(1.096) = 1314.13$$
$$Q = 1000(1.0835)(1.086)(1.0885) = 1280.82$$
$$R = 1000(1.095)(1.10)(1.10) = 1324.95$$
Thus, $R > P > Q$.

31.   Solution: A

I.   True
II. Risk factors are ad hoc.
III. CAPM is simpler.

32.   Solution: E

We cannot rule out that X is Giffen: the effect of the price decrease for a Giffen good is to decrease consumption and the effect of the decrease in income is to increase consumption (because a Giffen good is inferior). It is possible that the negative effect of the price decrease would outweigh the positive effect of the income decrease.

We cannot rule out the possibility that X is normal: the effect of the price reduction would be to increase consumption and the effect of the income decrease would be to decrease consumption and the effect of the income decrease could outweigh the effect of the price decrease.

We can rule out the possibility that X is non-Giffen inferior because, in that case, the total effect of the price reduction would be to increase consumption and the effect of the income decrease would also be to increase consumption. The question indicates consumption decreases.

33. Solution: A

$$30 \cdot a_{\overline{10}|} + 60 \cdot v^{10} \cdot a_{\overline{10}|} + 90 \cdot v^{20} \cdot a_{\overline{10}|} =$$

$$a_{\overline{10}|} \cdot \left[30 + 60v^{10} + 90v^{20} \right] = 55a_{\overline{20}|} = 55 \cdot a_{\overline{10}|} \left(1 + v^{10} \right)$$

$$90v^{20} + 5v^{10} - 25 = 0$$

$$v^{10} = -5 \pm \frac{\sqrt{25 + 9000}}{180} = \frac{90}{180} = 0.5$$

$$\therefore i = 7.18\%$$

$$x = 55 \cdot a_{\overline{20}|7.18} = 574.60$$

34. Solution: D

$$\frac{1 - T_p}{(1 - T_{pE})(1 - T_c)} = \frac{(1 - 0.38)}{(1 - 0.38)(1 - 0.35)} = 1.538$$

35. Solution: E (See note.)

I.   True, Landsburg, p. 500
II.   True, Landsburg, pp. 491-492
III.   True, Landsburg, p. 505

Note: While Statement II is true based on material in Chapter 14, the definition of a Pigou tax was introduced in Chapter 13, which was not on the Syllabus. As a result, it was decided to score both options (C) and (E) as correct for the May 2003 exam.

36.   Solution: B

$$\text{Eric's profit} = 2X + 32 - 16 = 16 + 2X$$
$$\text{Jason's profit} = -X + 32 - 16 = 16 - X$$

Margin = 400 for both Eric and Jason

$$\text{Yield} = \frac{16 + 2X}{400} = 2\left(\frac{16 - X}{400}\right)$$
$$X = 4$$

Yield: $\dfrac{16 + 2(4)}{400} = 6\%$

37.   Solution: D

The company's forecasted dividends and prices grow as follows:

	Year 1	Year 2	Year 3
Dividend	20	21.20	22.47
Price	636	674	714

Calculate the expected rate of return:

From year 0 to year 1: $\dfrac{20 + (636 - 600)}{600} = 0.093$

From year 1 to year 2: $\dfrac{21.20 + (674 - 636)}{636} = 0.093$

From year 2 to year 3: $\dfrac{22.47 + (714 - 674)}{674} = 0.093$

38.   Solution: A

If the central bank is targeting real output growth, and if the central bank is putting downward pressure on the discount rate, then that suggests that the economy is growing at a rate that is below the target rate, and in order to achieve the objective the central bank would buy bonds on the open market.

39.   Solution: D

Since the first ten payments equal the annual interest due, the amount outstanding at the end of 10 years is the amount of loan: 1000 . For the next 10 years, each payment equals 150% of interest due. The lender charges 10%, therefore <u>5% of the principal outstanding will be used to reduce the principal.</u>

At the end of 20 years, the amount outstanding is $1000(1-0.05)^{10} = 598.74$

$$\frac{598.74}{a_{\overline{10}|10\%}} = 97.4417$$

40.   Solution: E

Use Black-Scholes formula:

Value of call option $= \left[N(d_1) \times P\right] - \left[N(d_2) \times PV(EX)\right]$

$\qquad\qquad P = 122 \qquad\qquad\qquad \sigma = 0.2 \qquad\qquad\qquad\qquad t = 1$

$$ln\left[\frac{P}{PV(EX)}\right] = 0.2 \qquad \Rightarrow \quad PV(EX) = \frac{P}{e^{0.2}} = 99.89$$

$$d_1 = \frac{ln\left[\dfrac{P}{PV(EX)}\right]}{\sigma\sqrt{t}} + \frac{\sigma\sqrt{t}}{2} = \frac{0.2}{0.2\sqrt{1}} + \frac{0.2\sqrt{1}}{2} = 1.0 + 0.1 = 1.1$$

From Normal table, $N(1.1) = 0.8643$

$$d_2 = d_1 - \sigma\sqrt{t} = 1.1 - 0.2\sqrt{1} = 0.9$$

$$N(0.9) = 0.8159$$

Value of call option $= (0.8643)(122) - (0.8159)(99.89) = 23.95 \approx 24$

41.   Solution: C

The supply curve can be written as: $P = \frac{1}{5}Q - 5$. Adjusting for the tax of 5, $P = \frac{1}{5}Q$
or $Q = 5P$. Thus $P = 10$ and $Q = 50$. Then the tax revenue is $5 \times 50 = 250$.

42.   Solution: B

$i = 6\%$

$BV_6 = 10,000v^4 + 800a_{\overline{4}|0.06} = 7920.94 + 2772.08 = 10,693$

$I_7 = i \times BV_6 = 0.06 \times 10,693 = 641.58$

43.   Solution: E

I is true since the strong form is broader than the semi-strong form.
II is true—the fact that portfolio managers can't consistently outperform the market is an indication that the market is efficient.
III is true by definition.

44.   Solution: A

There is not a market for everything. In this case the supply function lies everywhere above the demand function; hence the quantity of output in this industry is zero.

45.   Solution: C

$$\frac{100}{0.08} = 1250$$

$$1250 = X\left[v + 1.08v^2 + \cdots + 1.08^{24}v^{25}\right] = 25Xv$$

$$54 = X$$

$$\frac{Y}{0.08} = 54\left[1.08^{10}v + 1.08^{11}v^2 + \cdots + 1.08^{24}v^{15}\right] = 54(1.08)^9[15]$$

$$Y = 129.5$$

46.   Solution: E

Current ratio = Current assets/Current liabilities
Quick ratio = (Cash + Short-term securities + Receivables)/Current liabilities
Quick ratio does not involve inventories, so it will not change, since inventories is a current asset, increase in inventories will cause the current ratio to go up.

47.   Solution: A or B

The expansionary policy puts downward pressure on interest rates and thus produces an increase in investment. However, the effect on net exports is unclear. The expansionary policy puts downward pressure on the exchange rate, causing an increase in net exports as the price of domestic goods falls relative to foreign goods. The difficulty is that net exports also depends on income. As investment increases, income increases. An increase in income will cause net exports to decrease. Since the net effect of these changes is not discernible, it was decided to score both options (A) and (B) as correct for the May 2003 exam.

48.   Solution: B

The calculation of the percentage change in quantity exchanged follows from the definition of price elasticity of demand – i.e., percentage change in quantity demanded divided by percentage change in price. If price increases by 3%, then it must be the case that the quantity exchanged will fall by 2.25% .

49.   Solution: D

I. is false. Managers focus more on dividend changes than on absolute levels.

50.   Solution: C

$$10\left(1-\frac{d}{4}\right)^{-40}(1.03)^{40} + 20(1.03)^{30} = 100$$

$$10\left(1-\frac{d}{4}\right)^{-40} = 15.77$$

$$1-\frac{d}{4} = 0.98867052$$

$$\therefore d = 0.0453$$