COURSE 2

MAY 2001

1. Which of the following statements is an implication of the semi-strong form of the Efficient Market Hypothesis?

(A) Market price reflects all information.

(B) Prices slowly adjust over time to incorporate past information.

(C) Past price data should have predictive power for stock returns.

(D) Actively managed portfolios cannot consistently outperform the market.

(E) The correct answer is not given by (A), (B), (C), or (D).

2. The free rider problem is considered a major reason that public goods are provided by the government rather than by the private market.

Which of the following explains why the free rider problem occurs?

(A) It is impossible to exclude non-paying consumers, which makes it difficult for private firms to collect sufficient revenue.

(B) The use of these goods by an additional consumer imposes extra social costs on everyone else.

(C) There are some consumers who place no value on public goods and thus are not willing to pay a positive price.

(D) These goods are too expensive to be provided by the private marketplace.

(E) The long-run marginal cost of these goods lies below the long-run average cost.

3. Suppose the economy is entering the contractionary phase of a business cycle.

Which of the following is an indicator of this downturn in economic activity?

(A) A decrease in the unemployment rate

(B) An increase in the number of new building permits for private housing units

(C) An increase in stock prices

(D) An increase in delivery lags

(E) An increase in business inventories

4. A 20-year loan of 20,000 may be repaid under the following two methods:

i) amortization method with equal annual payments at an annual effective rate of 6.5%

ii) sinking fund method in which the lender receives an annual effective rate of 8% and the sinking fund earns an annual effective rate of j

Both methods require a payment of X to be made at the end of each year for 20 years.

Calculate j .

(A) $j \leq 6.5\%$

(B) $6.5\% < j \leq 8.0\%$

(C) $8.0\% < j \leq 10.0\%$

(D) $10.0\% < j \leq 12.0\%$

(E) $j > 12.0\%$

5. A perpetuity-immediate pays X per year. Brian receives the first n payments, Colleen receives the next n payments, and Jeff receives the remaining payments. Brian's share of the present value of the original perpetuity is 40%, and Jeff's share is K .

Calculate K .

(A) 24%

(B) 28%

(C) 32%

(D) 36%

(E) 40%

6. Suppose a constant-cost, competitive industry is in long-run equilibrium. Now suppose the government imposes an annual licensing fee as a requirement for firms to produce in the industry.

As a result of this fee, what will happen to the quantity supplied in the market and the quantity supplied by an individual firm in the long run?

(A) The quantity supplied in the market will increase, and the quantity supplied by an individual firm will increase.

(B) The quantity supplied in the market will increase, but the quantity supplied by an individual firm will decrease.

(C) The quantity supplied in the market will decrease, but the quantity supplied by an individual firm will not change, as some firms go out of business.

(D) The quantity supplied in the market will decrease, and the quantity supplied by an individual firm will decrease.

(E) The quantity supplied in the market will decrease, but the quantity supplied by an individual firm will increase.

7. Seth, Janice, and Lori each borrow 5000 for five years at a nominal interest rate of 12%, compounded semi-annually. Seth has interest accumulated over the five years and pays all the interest and principal in a lump sum at the end of five years. Janice pays interest at the end of every six-month period as it accrues and the principal at the end of five years. Lori repays her loan with 10 level payments at the end of every six-month period.

Calculate the total amount of interest paid on all three loans.

(A) 8718

(B) 8728

(C) 8738

(D) 8748

(E) 8758

8. The following is given for Company X:

Authorized number of shares	600,000
Common stock ($1 par value)	$ 450,000
Additional paid-in capital	$1,000,000
Retained Earnings	$5,000,000
Treasury Stock	$ 150,000

The company plans to issue an additional 100,000 shares at $3 per share.

Which of the following is true?

(A) Authorized number of shares will be 700,000 .

(B) Common stock will be $750,000 .

(C) Additional paid-in capital will be $1,200,000 .

(D) Retained earnings will be $5,200,000 .

(E) Treasury stock will be $50,000 .

9. Which of the following statements regarding consumer goods in the marketplace is true?

(A) The quantity demanded of an inferior good decreases as its price decreases.

(B) The intersection of a consumer's Engel curve and demand curve represents how much the consumer will buy given a specific income level.

(C) When the price of a normal good decreases, the increase in quantity due to the income effect cannot be greater than the substitution effect.

(D) The compensated demand curve for a normal good will be steeper than the uncompensated demand curve.

(E) The income elasticity of demand is equal to the slope of the Engel curve.

10. A company is considering two projects. Project X requires an investment of 4000 today ($t = 0$) and will return level cash flows at the end of each year for 8 years. The IRR is 10% .

Project Y also requires an investment of 4000 today ($t = 0$) and will return a single cash flow of 6600 at the end of 5 years.

The risk-free rate is 2.5%, the market risk premium is 7% and the estimated beta is 0.50 .

Compared to Project Y, which of the following is true?

(A) Project X has a shorter payback period, a lower IRR and lower NPV .

(B) Project X has a shorter payback period, a higher IRR and higher NPV .

(C) Project X has a longer payback period, a lower IRR and lower NPV .

(D) Project X has a longer payback period, a higher IRR and higher NPV .

(E) Project X has a longer payback period, a lower IRR and higher NPV .

11. Machine I costs X, has a salvage value of $\frac{X}{8}$, and is to be depreciated over 10 years using the declining balance method.

Machine II costs Y, has a salvage value of $\frac{X}{8}$, and is to be depreciated over 10 years using the sum-of-the-years digits method.

The total amount of depreciation in the first seven years for Machine I equals the total amount of depreciation in the first seven years for Machine II.

Calculate $\frac{Y}{X}$.

(A) 0.94

(B) 0.99

(C) 1.04

(D) 1.09

(E) 1.14

12. Bruce and Robbie each open up new bank accounts at time 0 . Bruce deposits 100 into his bank account, and Robbie deposits 50 into his. Each account earns an annual effective discount rate of d .

The amount of interest earned in Bruce's account during the 11th year is equal to X . The amount of interest earned in Robbie's account during the 17th year is also equal to X .

Calculate X .

(A) 28.0

(B) 31.3

(C) 34.6

(D) 36.7

(E) 38.9

13. Ron has a loan with a present value of $a_{\overline{n}|}$. The sum of the interest paid in period t plus the principal repaid in period $t + 1$ is X .

Calculate X .

(A) $1 + \frac{v^{n-t}}{i}$

(B) $1 + \frac{v^{n-t}}{d}$

(C) $1 + v^{n-t}i$

(D) $1 + v^{n-t}d$

(E) $1 + v^{n-t}$

14. Which of the following statements about productivity is true?

(A) Government spending on infrastructure improvements does not contribute to productivity growth because it does not increase the capital stock.

(B) Real wage growth is largely a function of productivity growth.

(C) Changes in the demographic composition of the workforce do not have any impact on productivity.

(D) If labor is growing at the same rate as capital then labor productivity will be unchanged.

(E) A shift in the economy to a greater proportion of service jobs would not be expected to affect productivity.

15. Tom can produce pizzas at a cost of 10 per pizza, and deliver pizzas at a cost of 2 per pizza. The equilibrium price for a pizza delivered to the door of a consumer is 12.5 . Tom currently produces and delivers 10 pizzas each night. Tom spends half his time producing pizzas and half his time delivering pizzas.

Assuming unlimited demand at the current equilibrium price, what is the largest daily rate Tom could pay a delivery service without decreasing his profit?

(A) 5

(B) 10

(C) 20

(D) 45

(E) 50

16. The money supply is determined by the combined actions of the central bank, the commercial banking system, and the public's preferences regarding how they hold money.

Which of the following will result in an increase in the money supply?

(A) An increase in the public's demand for currency.

(B) An exogenous increase in market interest rates.

(C) The central bank increases the discount rate.

(D) The central bank increases the reserve requirement ratio.

(E) The central bank sells bonds to the public.

17. At an annual effective interest rate of i, $i > 0\%$, the present value of a perpetuity paying 10 at the end of each 3-year period, with the first payment at the end of year 6, is 32 .

At the same annual effective rate of i, the present value of a perpetuity-immediate paying 1 at the end of each 4-month period is X .

Calculate X .

(A) 38.8

(B) 39.8

(C) 40.8

(D) 41.8

(E) 42.8

18. Which of the following statements must be true for a natural monopoly?

(A) Setting price equal to marginal cost would result in a loss.

(B) Marginal costs are high whereas fixed costs are low.

(C) The marginal cost curve is falling at the point where it crosses the industry demand curve.

(D) Producing at the intersection of marginal revenue and marginal cost would result in a loss.

(E) Average and marginal cost curves intersect below the industry demand curve.

19. Consider the following project:

Time	0	1	2	3
Net cash flow	–1000.0	240.0	628.4	628.4

Assuming a 20% opportunity cost of capital, the NPV is zero.

Calculate the expected economic income in the second year.

(A) 192

(B) 388

(C) 436

(D) 526

(E) 628

20. Suppose that in the long run, real output is growing at 2.75% per year and the velocity of money is growing at 1.0% per year. Further suppose that the monetary authorities have a target rate of inflation between 0.0% and 1.0% per year.

Which of the following is most consistent with the goal of the monetary authorities?

(A) Money supply growth should be less than 1.75% per year.

(B) Money supply growth should be between 1.75% and 2.75% per year.

(C) Money supply growth should be between 2.75% and 3.75% per year.

(D) Money supply growth should be greater than 3.75% per year.

(E) Money supply growth does not matter; in the long run, the price level is determined by technological change and the growth of labor and capital inputs.

21. In the market for personal computers, the demand and supply are neither perfectly elastic nor perfectly inelastic. Suppose there is an exogenous increase in the wages of workers who manufacture computer chips used in personal computers.

What will happen to price and quantity in the personal computer market?

(A) Neither the price nor the quantity exchanged will change.

(B) Price will decrease, and the quantity exchanged will increase.

(C) Price will decrease, and the quantity exchanged will decrease.

(D) Price will increase, and the quantity exchanged will increase.

(E) Price will increase, and the quantity exchanged will decrease.

22. A company invests 20,000 in a project. The project is expected to have cash flows of 3000 at the end of each year for 15 years, with the first cash flow expected one year after the initial investment. Using the project's after-tax weighted average cost of capital, the project has a net present value of 2496.27 .

The following gives additional information about the company:

(i) The company is financed with 40% equity and 60% debt.

(ii) The company's marginal tax rate is 25% .

(iii) $r_E = 2r_D$, where r_E is the cost of equity and r_D is the cost of debt.

Calculate r_E .

(A) 10.25%

(B) 12.40%

(C) 13.25%

(D) 14.60%

(E) 16.40%

23. Suppose that there is an overall increase in both real income and interest rates observed in the economy.

Using the IS/LM framework, this observation can best be explained by which of the following events?

(A) A rightward shift in the LM curve caused by an expansionary monetary policy.

(B) A leftward shift in the LM curve due to an exogenous increase in the domestic price level.

(C) A leftward shift in the IS curve due to an exogenous increase in savings as more people become concerned about retirement.

(D) An increase in government spending for national defense that results in a rightward shift in the IS curve.

(E) An increase in personal income taxes to reduce the deficit.

24. A company has an asset with a depreciation basis of 100,000 which can be depreciated by the following schedule:

Year	Percent
1	33.33
2	44.45
3	14.81
4	7.41

The marginal tax rate is 35% and the pretax borrowing rate is 12% .

Calculate the present value of the tax shields created by the depreciation.

(A) 26,045

(B) 28,156

(C) 30,267

(D) 32,633

(E) 35,000

25. Which of the following must be true for a competitive firm to continue operating in the short run?

I. Total Revenue – Total Costs + Fixed Costs > 0

II. Marginal Costs > Average Costs

III. Price > Average Variable Costs

(A) III only

(B) I and II only

(C) I and III only

(D) II and III only

(E) I, II, and III

26. Susan invests Z at the end of each year for seven years at an annual effective interest rate of 5% . The interest credited at the end of each year is reinvested at an annual effective rate of 6% . The accumulated value at the end of seven years is X .

Lori invests Z at the end of each year for 14 years at an annual effective interest rate of 2.5% . The interest credited at the end of each year is reinvested at an annual effective rate of 3% . The accumulated value at the end of 14 years is Y .

Calculate $\frac{Y}{X}$.

(A) 1.93

(B) 1.98

(C) 2.03

(D) 2.08

(E) 2.13

27. Jose and Chris each sell a different stock short for the same price. For each investor, the margin requirement is 50% and interest on the margin debt is paid at an annual effective rate of 6% .

Each investor buys back his stock one year later at a price of 760 . Jose's stock paid a dividend of 32 at the end of the year while Chris's stock paid no dividends.

During the 1-year period, Chris's return on the short sale is i, which is twice the return earned by Jose.

Calculate i .

(A) 12%

(B) 16%

(C) 18%

(D) 20%

(E) 24%

28. Assume that a monopolist's demand and marginal cost functions are given by the following formulas:

Demand: $P = 10 - Q$

Marginal Cost: $MC = Q + 1$

where P is price and Q is quantity.

What price will the monopolist charge?

(A) 5

(B) 6

(C) 7

(D) 8

(E) 9

29. In a country that does not trade with the rest of the world, the marginal propensity to consume is 0.7, and the income tax rate is 30% .

What is the country's government expenditure multiplier?

(A) 1.10

(B) 1.96

(C) 2.04

(D) 3.33

(E) 4.76

30. A stock price can go up by 20% or down by 15% over the next period. The current stock price is greater than 70 . You own a one-period put on the stock. The put has an exercise price of 78.26. The risk-free rate is 11.25% .

If the put is exercised today, the amount received will be X . The price of the put today (unexercised) is also X .

Calculate the current stock price.

(A) 74.50

(B) 75.00

(C) 76.50

(D) 78.00

(E) 78.25

31. You are given the following information about an investment account:

Date	Value Immediately Before Deposit	Deposit
January 1	10	
July 1	12	X
December 31	X	

Over the year, the time-weighted return is 0%, and the dollar-weighted return is Y.

Calculate Y.

(A) –25%

(B) –10%

(C) 0%

(D) 10%

(E) 25%

32. Which of the following statements about the short-run supply curve for a competitive industry is FALSE?

(A) As price rises, industry output goes up because firms in the industry increase production.

(B) As price rises, firms not previously producing will start up production and thereby further increase industry output.

(C) As price rises, entry of new firms tends to make the industry supply curve more elastic than the supply curve of typical firms in the industry.

(D) As price and output increase for the industry, the factor-price effect is likely to make the industry supply curve less elastic.

(E) As price and output increase for the industry, the marginal cost curve of each firm in the industry will likely shift down because of the factor-price effect.

33. You are given:

Current Liabilities	300
Long Term Liabilites	700
Shareholder Equity	1400
Total Assets	2400
EBIT	400
Depreciation	100
Interest	50
Taxes	60

The company's Payout Ratio is 10% .

Determine the company's Internal Growth Rate.

(A) 7.1%

(B) 8.1%

(C) 8.9%

(D) 9.1%

(E) 10.9%

34. Suppose there is an economy that produces only one good, X, and suppose that the competitive supply and demand functions for X are:

$$\text{Supply:} \quad Q = 5P$$

$$\text{Demand:} \quad Q = 20 - 5P$$

where P is price and Q is quantity.

Further suppose that the government imposes a price ceiling of 1, which is perfectly enforced at no cost.

Assuming that the supply curve does not shift due to the price ceiling, what is the deadweight loss from the price ceiling?

(A) 2.5

(B) 5.0

(C) 10.0

(D) 15.0

(E) 20.0

35. Which of the following are true?

I. The variance of equity returns in an equal-weighted portfolio is proportional to the number of stocks held.

II. Beta is the correlation between the returns on an asset and the returns on the market portfolio.

III. In empirical tests, the slope of the CAPM is estimated to be steeper than theory would suggest.

(A) None

(B) I only

(C) II only

(D) III only

(E) I, II, and III

36. Suppose that over the past year, the nominal exchange rate increased from 1.25 German marks per U.S. dollar to 1.50 . Further suppose that over this period the U.S. inflation rate was 3% and the German rate was 2% .

What is the change in the real exchange rate?

(A) +1%

(B) +19%

(C) +21%

(D) +23%

(E) +25%

37. Seth borrows X for four years at an annual effective interest rate of 8%, to be repaid with equal payments at the end of each year. The outstanding loan balance at the end of the second year is 1076.82 and at the end of the third year is 559.12 .

Calculate the principal repaid in the first payment.

(A) 444

(B) 454

(C) 464

(D) 474

(E) 484

38. You are the chief actuary for a small, all-equity financed insurer. The current book value of equity is 1000 . In years 1 and 2, you will earn a Return on Equity (ROE) of 20% and reinvest all earnings. Starting in year 3 (and every year thereafter), your company's ROE will be 15%, your free cash flow will be 50% of annual earnings, and you will pay a dividend equal to 100% of free cash flow. You have been approached by another insurer who would like to buy your company.

Assuming an opportunity cost of capital equal to 15%, use Discounted Cash Flow to find the value of your company.

(A) 1000

(B) 1089

(C) 1264

(D) 1440

(E) 1444

39. A firm has a debt ratio of 0.4 . The firm also has a debt beta of 0.75 and an equity beta of 1.50 . The expected return on the market is currently 11% and the risk-free interest rate is 5% .

What is the required return on an investment project that expands the firm's existing operations while maintaining the current target capital structure?

(A) 10%

(B) 11%

(C) 12%

(D) 14%

(E) 15%

40. You are interested in purchasing a call option on a common stock that is currently trading at a price of 100 per share. You are given the following information:

(i) the standard deviation of the continuously compounded annual rate of return on the stock is 0.4;

(ii) the time to maturity of the call is 3 months (0.25 years); and

(iii) $\ln\left(\frac{\text{Current Share Price}}{\text{Present Value of the Exercise Price}}\right) = -0.08$, at the risk-free rate.

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

(A) 0.8

(B) 1.8

(C) 2.8

(D) 3.8

(E) 4.8

41. Bill buys a 10-year 1000 par value 6% bond with semi-annual coupons. The price assumes a nominal yield of 6%, compounded semi-annually.

As Bill receives each coupon payment, he immediately puts the money into an account earning interest at an annual effective rate of i .

At the end of 10 years, immediately after Bill receives the final coupon payment and the redemption value of the bond, Bill has earned an annual effective yield of 7% on his investment in the bond.

Calculate i .

(A) 9.50%

(B) 9.75%

(C) 10.00%

(D) 10.25%

(E) 10.50%

42. The supply and demand functions for a good are:

$$\text{Supply:} \quad P = 1 + 4Q$$

$$\text{Demand:} \quad P = 4 - 2Q$$

where P is price and Q is quantity.

Now suppose an increase in the price of an input causes the supply function to become:

$$\text{Supply:} \quad P = 2 + 4Q$$

What is the price elasticity of demand at the initial equilibrium?

(A) –3.00

(B) –2.00

(C) –0.50

(D) –0.33

(E) +0.33

43. The market value of a company's liabilities consists of 40 of debt and 80 of equity, for total liabilities of 120 .

The β for the company's debt and equity are 0.3 and 1.65, respectively. The expected return on the company's debt is 9% . The company has a weighted average cost of capital of 14% .

Which of the following statements are true, ignoring the effect of taxes?

I. If the proceeds from issuing additional equity of 10 are used to retire 10 of debt, the company's cost of capital will increase to 14.6% .

II. If a proposed new project has a β of 1.05, the project is riskier than the company's existing business.

III. If the risk-free rate is 8%, then the expected risk premium on the market is 5% .

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I and III only

44. A company has Earnings Before Interest and Taxes (EBIT) of 11,560 . The company has 100,000 of 6% debt outstanding. The company's corporate tax rate is 35% . The company paid out 1000 as a dividend and had an average equity of 20,912 during the year.

Determine the Return on average Equity (ROE) for the company's stock.

(A) 7.2%

(B) 12.5%

(C) 14.2%

(D) 17.3%

(E) 35.9%

45. At time $t = 0$, 1 is deposited into each of Fund X and Fund Y . Fund X accumulates at a force of interest $\delta_t = \frac{t^2}{k}$. Fund Y accumulates at a nominal rate of discount of 8% per annum convertible semiannually.

At time $t = 5$, the accumulated value of Fund X equals the accumulated value of Fund Y .

Determine k .

(A) 100

(B) 102

(C) 104

(D) 106

(E) 108

46. A utility-maximizing consumer has indifference curves of the form:

$$U = XY$$

where U is the consumer's utility,

X is the number of units of meat consumed, and

Y is the number of units of bread consumed.

The consumer buys only meat and bread. Meat costs 5 per unit, and bread costs 3 per unit.

If the consumer's utility is 12, how many units of meat are purchased?

(A) 1.7

(B) 2.7

(C) 4.5

(D) 7.2

(E) 20.0

47. Which of the following is most consistent with the monetarists' long-run view of the macroeconomy?

(A) The growth of real output is determined by technology and the growth of inputs.

(B) The growth of real output is determined by changes in the velocity of money.

(C) The growth of real output is determined by the growth in the wage rate.

(D) Inflation is determined by the wage-price spiral.

(E) Inflation is determined by changes in the velocity of money.

48. A company's stock is currently selling for 28.50 . Its next dividend, payable one year from now, is expected to be 0.50 per share. Analysts forecast a long-run dividend growth rate of 7.5% for the company.

Tomorrow the long-run dividend growth rate estimate changes to 7% .

Calculate the new stock price.

(A) 22.2

(B) 23.8

(C) 25.9

(D) 28.0

(E) 28.5

49. Tawny makes a deposit into a bank account which credits interest at a nominal interest rate of 10% per annum, convertible semiannually.

At the same time, Fabio deposits 1000 into a different bank account, which is credited with simple interest.

At the end of 5 years, the forces of interest on the two accounts are equal, and Fabio's account has accumulated to Z .

Determine Z .

(A) 1792

(B) 1953

(C) 2092

(D) 2153

(E) 2392

50. The present values of the following three annuities are equal:

(i) perpetuity-immediate paying 1 each year, calculated at an annual effective interest rate of 7.25%

(ii) 50-year annuity-immediate paying 1 each year, calculated at an annual effective interest rate of j%

(iii) n-year annuity-immediate paying 1 each year, calculated at an annual effective interest rate of $j - 1$%

Calculate n .

(A) 30

(B) 33

(C) 36

(D) 39

(E) 42

Course 2
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Answer Key

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