第一部分：（共五十分）　※ 注意：請於試卷內之「選擇題作答區」依序作答。

I. Suppose you work for an investment bank and need to design a forward contract for a client to borrow $20M over a one year period that starts three years from now. Assume both the investment bank and the client have good credit so that you could treat all cash flows as risk free. Assume the zero-coupon treasury yield curve is as follows:

Maturity	1	2	3	4
Yield	0.05	0.06	0.065	0.07

1. Assuming zero profit for the bank, what is the rate you could quote on this forward contract? Choose the closest answer.
   a. 7.8%
   b. 8.5%
   c. 9.2%
   d. 9.9%
   e. 10.6%
2. Using the treasury bonds provided above to design this forward contract with zero cost (assuming a frictionless market), you would pay _____ to purchase a three-year bond, and finance this cost by short-selling a four-year bond with _____ face value. Choose the closest answer for the two blanks above, respectively.
   a. 18.5 million, 24.9 million
   b. 13.9 million, 23.4 million
   c. 14.2 million, 22.9 million
   d. 16.6 million, 21.7 million
   e. 15.1 million, 20.1 million

II. Consider a firm with an earnings-per-share of $3 at the end of the first year, a dividend-payout ratio of 30%, a return on retained earnings of 10%, and an appropriate discount rate of 8%. Assume the firm will maintain its payout ratio, profitability from its retained earnings, and discount rate constant for the foreseeable future.

3. What is the theoretical stock price under the dividend growth model? Choose the closest answer.
   a. 90
   b. 95
   c. 100
   d. 105
   e. 110
4. Under the NPVGO model, the net present value of all future growth opportunities will be determined by an infinite number of investments the firm makes every period. What is the NPV (per share) of the investment that the firm will be making at the end of first year? Choose the closest answer.
   a. 0.138
   b. 0.210
   c. 0.362
   d. 0.440
   e. 0.525

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III. You work for a fund-of-fund and your supervisor has asked you to study the performance of a particular long-only equity fund. You decided to use this fund's historical monthly returns (R_{it}) and estimate the Fama-French-Carhart model as below:

$$R_{it} = \alpha + \beta_1 * (R_{Mt} - R_{ft}) + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * WML_t + e_t,$$

where α is the intercept, and β's are the risk loadings. Suppose the intercept estimate is -0.02, and the estimates of the risk loadings are 1.2, -0.8, 0.12, and 0.7, respectively. Also suppose these estimates are all statistically significant at conventional levels.

5. Does the manager have skill relative to the risk model? What are the characteristics of stocks this fund manager likes to invest?
   a. Yes, the manager has skill. The manager prefers high beta, small, growth, and winner stocks.
   b. No, the manager does not have skill. The manager prefers high beta, large, value, and winner stocks.
   c. Yes, the manager has skill. The manager prefers low beta, small, growth, and loser stocks.
   d. No, the manager does not have skill. The manager prefers low beta, large, growth, and winner stocks.
   e. Yes, the manager has skill. The manager prefers low beta, large, growth, and winner stocks.

IV. If an equity portfolio consists of N stocks.

6. Which of the following statement is *incorrect*?
   a. Portfolio return is the weighted average of the individual stock returns.
   b. When N is large, the importance of individual stock variances is not important compared to return correlations between stocks.
   c. A large market downturn typically decreases correlations between stocks.
   d. Portfolio variance is the weighted average of each stock's correlation with the portfolio.
   e. None of the above.

V. No arbitrage opportunity is an important pillar of the efficient market hypothesis (EMH). However, arbitrage in practice is risky. Therefore, limits to arbitrage can prevent security prices from being informationally efficient.

7. Which of the following is *incorrect* regarding limits to arbitrage?
   a. Arbitrageurs face fundamental risk, making it difficult to hedge away price impacts from unfavorable news with substitute stocks.
   b. One reason that stock market anomalies are typically stronger among small and illiquid stocks is because of limits to arbitrage.
   c. Limits to arbitrage lead to downward sloping demand curves for stocks.
   d. Even if there is no fundamental risk, investor sentiment poses risks to arbitrageurs.
   e. None of the above.
8. Which of the following is *incorrect* regarding the EMH?
   a. The momentum effect is a violation of weak market efficiency.
   b. The U.S. stock market satisfies semi-strong market efficiency.
   c. The pre-earnings-announcement drift (i.e., stock price predictability before earnings news) is a violation of strong market efficiency.
   d. Violations of law of one price are evidence against EMH.
   e. None of the above.

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VI. Suppose a firm is evaluating a project with the following free cash flows (in dollars):

Year	0	1	2	3	4	5
Yield	(8,500)	3,100	4,500	4,500	4,500	2,300

9. Assume the project has similar risk to the overall firm and the firm will not change its debt-to-equity ratio because of this project. If the firm's cost of equity is 10%, the cost of debt is 6%, the debt-to-value ratio is 50%, and the corporate income tax rate is 40%. What is the NPV of this project? Choose the closest answer.
    a. 6,674
    b. 7,156
    c. 8,103
    d. 9,468
    e. 10,012
10. Suppose a new equipment will be transferred to the project's associated laboratory. Currently (at t=0), the equipment has a resale value of $1,000 and a book value of $500. Suppose a managerial decision is made to not sell the equipment now and keep it until the end of year 5. Assume the remaining book value can be depreciated in year 1. Assume the expected selling price at the end of year 5 is $600. What would the adjusted FCFs after considering this new equipment from t=0 to t=5, respectively?
    a. -7,700; 3,300; 4,500; 4,500; 4,500; 2,660
    b. -7,700; 3,100; 4,500; 4,500; 4,500; 2,660
    c. -8,500; 3,300; 4,500; 4,500; 4,500; 2,660
    d. -7,700; 3,300; 4,500; 4,500; 4,500; 2,300
    e. -8,500; 3,300; 4,500; 4,500; 4,500; 2,300

第二部分：填空題（共五十分。每題 5 分）※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。
注意事項：
※※所有<u>非選項</u>問題(第 11、18、19、20 題)，均請詳列計算過程，若只有答案將不予計分※※

※※填空題題型請至少計算至小數點後第二位※※

※※答案請於答案卷(本)上標示清楚，如 ANS:___XXXXXX___※※

※※一律作答於所附之考試答案卷(本)上。若於試題卷上作答者，將不予計分※※

11. You want to design a portfolio that has a beta of zero. Stock X has a beta of 1.13 and Stock Y's beta is also close to 0.7. You are willing to include both stocks as well as a risk-free security in your portfolio. If your portfolio will have a combined value of $6,000, how much should you invest in Stock Y?

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12. Which of the following statements is/are FALSE?
A) We can rule out inefficient portfolios because they represent inferior investment choices.
B) We say a portfolio is an efficient portfolio whenever it is possible to find another portfolio that is better in terms of both expected return and volatility.
C) Correlation has no effect on the expected return on a portfolio.
D) The efficient portfolios are those portfolios offering the lowest possible level of volatility for a given level of expected return.
E) A positive investment in a security can be referred to as a long position in the security.
F) It is possible to invest a negative amount in a stock or security call a short position.
G) A short sale is a transaction in which you buy a stock that you do not own and then agree to sell that stock back in the future.
H) The efficient portfolios are those portfolios offering the highest possible expected return for a given level of volatility.
I) When two stocks are perfectly negatively correlated, it becomes possible to hold a portfolio that bears absolutely no risk.
J) We say a portfolio is long those stocks that have negative portfolio weights.

13. Suppose you invest in 300 shares of NTU at \$55 per share, 150 shares of LBS at \$40 per share, and 250 shares of AUS at \$60 per share. Suppose over the next year NTU has a return of 18%, AUS has a return of 20%, and LBS has a return of -8%. The weight on LBS in your portfolio after one year is closest to:
A) 19.0%
B) 17.8%
C) 12.8%
D) 10.0%

14. Which of the following statements is/are FALSE?
A) We must discount the cash flows from stock based on the equity cost of capital for the stock.
B) The divided yield is the percentage return the investor expects to earn from the dividend paid by the stock.
C) The firm might pay out cash to its shareholders in the form of a dividend.
D) An investor will be willing to pay up to the point at which the current price of a share of stock equals the present value of the expected future dividends an expected future sale price.
E) The expected total return of a stock should equal the expected return of other investments available in the market with equivalent risk.
F) The total amount received in dividends and from selling the stock will depend on the investor's investment horizon.
G) The dividend yield is the expected annual dividend of a stock, divided by its expected future sale price.
H) If the current stock price were greater than $P_0 = \frac{Div_1 + P_1}{1 + r_E}$, it would be a positive NPV investment, and we would expect investors to rush in and buy it, driving up the stock price.

15. Suppose that you currently have \$550,000 invested in a portfolio with an expected return of 15% and a volatility of 11%. The efficient (tangent) portfolio has an expected return of 16% and a volatility of 15%. The risk-free rate of interest is 4%.

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You want to maximize your expected return without increasing your risk. Without increasing your volatility beyond its current level, the maximum expected return you could earn is closest to:

A) 11.0%
B) 12.8%
C) 13.5%
D) 15.6%
E) 16.3%

16. David is a mutual fund manager at NTU Management. He can generate an alpha of 2.50% a year up to $750 million of invested capital. After that amount his skills are spread too thin, so he cannot add value and his alpha is zero for all investments over $750 million. NTU Management charges a fee of 0.50% on the total amount of money under management. Assume that there are always investors looking for positive alpha investments and no investor would invest in a fund with a negative alpha. Assume that the fund is in equilibrium, meaning that no investor either takes out money or wishes to invest new money into the fund. Then, the amount of fee income that David's fund will generate is closest to:

A) $10.75 million
B) $12.50 million
C) $15.75 million
D) $18.75 million

17. Which of the following statements is/are FALSE?

A) Nonzero alphas may merely indicate that the wrong market proxy is beings used; they do not necessarily indicate forgone positive NPV investment opportunities.
B) The true market portfolio contains much more than just stocks, it includes bonds, real estate, art, precious metals, and any other investment vehicles available.
C) Much of the investment wealth cannot be included in the proxy for the market portfolio since it does not trade in competitive markets.
D) If the true market portfolio is efficient, but the proxy portfolio is not highly correlated with the true market portfolio, then the true market portfolio will not be efficient and stocks will have nonzero alphas.
E) If investors have a significant amount of non-tradeable wealth, this wealth will be an important part of their portfolios, but will not be part of the market portfolio of tradeable securities.
F) If the entire portfolio of investments is efficient, then just the tradeable part of the portfolio should be efficient also.
G) Rather than relying on the efficiency of a single portfolio (such as the market), multifactor models rely on the weaker condition that an efficient portfolio can be constructed from a collection of well-diversified portfolios or factors.
H) Trading strategies based on market capitalization, book-to-market ratios, and momentum have been developed that appear to have zero alphas.
I) A positive alpha in a single factor model means that the portfolios that implement the trading strategy capture risk that is not captured by the market portfolio.
J) Multifactor models have a distinct advantage over single-factor models in that it is much easier to identify a collection of portfolios that captures systematic risk than just a single portfolio.

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18. MGMT LTD is expected to grow at various rates over the next five years. The company just paid a $1.50 dividend. The company expects to grow at 15% for the next two years, then the company expects to grow at 8% for three additional years after which the company expects to grow at a constant rate of 3% per year indefinitely. If the required rate of return on MGMT's common stock is 15%, then what is a share of MGMT's stock worth?

19. Charmander Corp. is trying to determine its optimal capital structure. The company's capital structure consists of debt and common stock. In order to estimate the cost of debt, the company has produced the following table:

Percent financed with debt (w_d)	Percent financed with equity (w_s)	Bond rating	Before-tax cost of debt
0.1	0.9	AA	6.00%
0.2	0.8	A	6.20%
0.3	0.7	BBB	7.00%
0.4	0.6	BB	7.80%
0.5	0.5	B	8.60%

The company uses the CAPM to estimate its cost of common equity, r_s. The risk-free rate is 4.5% and the market risk premium is 7%. Charmander estimates that if it had no debt its beta would be 0.8. The company's tax rate is 35%. On the basis of this information, what is the company's optimal capital structure, and what is the firm's cost of capital at this optimal capital structure?

20. Last year Bulbasaur Corp. had sales of $665,000, operating costs of $559,500, and year-end assets of $555,000. The debt-to-total-assets ratio was 31%, the interest rate on the debt was 8.5%, and the firm's tax rate was 35%. The new CFO wants to see how the ROE would have been affected if the firm had used a 50% debt-to-total-assets ratio. Assume that sales and total assets would not be affected, and that the interest rate and tax rate would both remain constant. By how much would the ROE change in response to the change in the capital structure?