

第一部分：財務管理，共五十分

壹、單選題 (每小題三分) ※ 注意：請於試卷內之「選擇題作答區」依序作答。

1. T-bills are issued by?
 - A) commercial banks
 - B) the government
 - C) corporations
 - D) individual investors
2. The initial margin is 60%. The maintenance margin is 35%. If you sold short 200 shares of common stock at \$40 per share, at what stock price would you receive a margin call?
 - A) 26.00
 - B) 47.41
 - C) 54
 - D) 65.18
3. Which of the following statements is(are) true?
 - I) Risk-averse investors reject investments that are fair games.
 - II) Risk-averse investors only accept risky investments that offer risk premiums over the risk-free rate.
 - III) Risk-neutral investors judge risky investments only by the expected returns.
 - III) Risk-averse investors judge investments only by their riskiness.
 - A) I only
 - B) II only
 - C) I and II only
 - D) II, III and IV only
 - E) I, II, and III only
4. The goal of which option trading strategy is to profit if the stock moves in either direction?
 - A) Covered call
 - B) Protective put
 - C) Long straddle
 - D) Long butterfly
 - E) Long call
5. According to the Security Market Line, $E(R_i) = R_f + \beta_i(E(R_m) - R_f)$, the slope is equal to:
 - A) R_f .
 - B) $R_f + \beta_i [E(R_m) - R_f]$.
 - C) β_i .
 - D) $E(R_m) - R_f$.
 - E) $(E(R_i) - R_f) / \beta_i$

貳、計算題及簡答題 (計算題答案須寫完整計算式，否則不予計分) 請於試卷內之「非選擇題作答區」

1. a. What is no-arbitrage principle? (二分)
- b. What is pure expectation theory of interest rates? (二分)

標明題號依序作答。

見背面

c. Suppose the annualized 1-year spot rate today is 2% and the annualized 2-year spot rate is 2.5%, what is the forward rate between 1 year and 2 years? Please show your analysis based on the no-arbitrage principle. (二分)

2. Equity (E) can be viewed as a call option the firm. Assuming: V = Value of the firm, D = Face Value of the outstanding debt.

a. What is the underlying asset? What is the exercise price? What is the payoff? (二分)

b. Please draw the payoff diagram. (二分)

3. Arrow stock has had the following year-end prices and dividends. What are the arithmetic and geometric returns for Arrow stock? (共五分，所有計算式請四捨五入至小數點後第 4 位，否則不予計分)

Year	Price	Dividend
1	\$48.52	\$0
2	\$51.65	\$0.58
3	\$59.68	\$0.61
4	\$45.22	\$0.65
5	\$56.18	\$0.72
6	\$55.29	\$1.21

4. Adam owns a portfolio equally invested in a risk-free asset and two stocks. If one of the stocks has a beta of 1.95 and the total portfolio is equally as risky as the market what must be the beta for the other stock in Adam's portfolio? (共二分，請四捨五入至小數點後第 2 位，否則不予計分)

5. Jason Corp. has a 5-year, 9% annual coupon bond with a \$1,000 par value. Earla Enterprise has a 10-year, 5% annual coupon bond with a \$1,000 par value. Both bonds currently have a yield to maturity of 6%. Calculate the percentage difference in bond prices for both bonds if the market yield increases to 7.5%? (共五分，請四捨五入至小數點後第 2 位，否則不予計分)

6. Paul has borrowed \$80,000 to buy a car. He plans to make monthly payments over a 3-year period. The bank has offered Paul a 9% interest rate compounded monthly. Calculate the total amount of interest dollars Paul will pay the bank over the life of the loan. (共五分，所有計算式請四捨五入至小數點後第 2 位，否則不予計分)

7. You are considering the following two independent projects. Both projects will be depreciated using the straight line depreciation to a zero book value over the life of the project. Neither project has any salvage value.

Project A		Project B	
Year	Cash flow	Year	Cash flow
0	-\$65,000	0	-\$45,000
1	\$12,000	1	\$11,000
2	\$60,000	2	\$26,000
3	\$11,000	3	\$25,000

Required rate of return: 9% for Project A and 15.6% for Project B

Required payback period: 3.0 years for Project A and 2 years for Project B

Based on net present value method of analysis and given the information above, which project(s) should you accept or reject _____

NOTE: You need to state the decisions for both projects.

(共五分，請四捨五入至小數點後第 2 位，否則不予計分)

8. NTU Corp. is considering two mutually exclusive projects with the following cash flows. Based on the cash flow differences computed from Project A minus Project B, the incremental IRR is _____ and if the required rate is higher than the crossover rate then project _____ should be accepted.

(每小題各 1.5 分，共三分，請四捨五入至小數點後第 2 位，否則不予計分)

	Project A	Project B
Year	Cash flow	Cash flow
0	-\$700,000	-\$555,000
1	\$450,000	\$390,000
2	\$250,000	\$250,000
3	\$330,000	\$200,000

第二部分：財金數學（含線性代數與微分方程），共五十分

參、計算題及簡答題（計算題答案須寫完整計算式，否則不予計分）

1. If Q is an orthogonal matrix, what is its determinant? (共四分)
2. Assume that λ_1 and λ_2 are the eigenvalues of a matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$. What is the trace of the matrix A ? What is the determinant of the matrix A ? (答案請表達成 λ_1 和 λ_2 的函數，否則不予計分) (共六分)
3. Define what is a positive definite matrix. Verify whether $A = \begin{bmatrix} 0.09 & 0.08 & 0.1 \\ 0.08 & 0.16 & 0.09 \\ 0.1 & 0.09 & 0.25 \end{bmatrix}$ is a positive definite matrix or not. (共六分)
4. Assume that $x_1, x_2,$ and $x_3,$ are three standard normal variables with the following variance-covariance matrix: $\begin{bmatrix} 1 & 0.5 & 0.4 \\ 0.5 & 1 & 0.3 \\ 0.4 & 0.3 & 1 \end{bmatrix}$. Express the above three standard normal variables as functions of three i.i.d. (*independent and identically distributed*) standard normal variables $\varepsilon_1, \varepsilon_2,$ and ε_3 . (Hint: You can apply Cholesky decomposition to the variance-covariance matrix.) (共九分)
5. 試解 $\frac{d^3 y}{dx^3} - 4 \frac{d^2 y}{dx^2} + 3 \frac{dy}{dx} = x^2$ 。 (共十分)
6. 設 y_1, y_2 皆為 x 的函數，求解 $\begin{cases} \frac{dy_1}{dx} = y_1 - 2y_2 \\ \frac{dy_2}{dx} = 2y_1 - 3y_2 \end{cases}$ 。 (共十五分)