第一部份：財務管理（共五十分。配分如各題標示）

1. Suppose a security with a risk-free cash flow of $150 in one year trades for $140 today. If there are no arbitrage opportunity, what is the current risk-free interest rate?（五分。答案須寫計算式，否則不予計分）

2. Assume zero-coupon yields (YTM) on default-free securities are as summarized in the following table.

Maturity (years)	1	2	3	4	5
Zero-coupon YTM	4.00%	4.30%	4.50%	4.70%	4.80%

　(i) Consider a four-year, default-free security with annual coupon payments and a face value of $1000 that is issued at par. What is the coupon rate of this bond?（五分。答案須寫計算式，否則不予計分）

　(ii) Consider a five-year, default-free bond with annual coupons of 5% and a face value of $1000. Explain whether this bond is trading at a premium or at a discount.（五分。答案限定三行，超過者不予計分）

3. Stock A has a volatility of 32% and a correlation of 20% with your current portfolio. Stock B has a volatility of 18% and a correlation of 55% with your current portfolio. You currently hold both stocks. Which of the following strategy will increase the volatility of your portfolio: (1) selling a small amount of Stock A and investing the proceeds in Stock B, or (2) selling a small amount of Stock B and investing the proceeds in Stock A?（五分。答案須寫計算式，否則不予計分）

4. What is the difference between the CAPM model and the Fama-French 3-factor model?（五分。答案限定三行，超過者不予計分）

5. XYZ Corp. will have $20 million of earnings before interests and taxes (EBIT) this coming year. It will also spend $7.5 million on total capital expenditures and increases in net working capital, and have $4 million in depreciation expenses. XYZ is currently an all-equity firm with a corporate tax rate of 30% and a cost of capital of 12%.
　(i) If XYZ is expected to grow by 8% per year, what is the market value of its equity today?（五分。答案須寫計算式，否則不予計分）
　(ii) If the interest rate on its debt is 9%, how much can XYZ borrow now and still have non-negative net income this coming year?（五分。答案須寫計算式，否則不予計分）

6. (i) Write down the equation of the "put-call parity" and define the variables in that equation.（五分）
　(ii) Explain, in both text and graph, why the equity of a firm can be viewed as a call option.（五分。答案限定五行，超過者不予計分）
　(iii) Based on the option characterization of a firm's debt and equity, interpret the agency conflicts between bondholders and stockholders when the firm undertakes a new investment that increases the risk of the firm.（五分。答案限定五行，超過者不予計分）

見背面

第二部份：財金數學（共五十分。每題五分）

1. 下列有關矩陣 A、B 和 C 的基本運算原則何者有誤？
   (a) $(A+B)^{\mathrm{T}} = A^{\mathrm{T}} + B^{\mathrm{T}}$
   (b) $(AB)^{\mathrm{T}} = A^{\mathrm{T}} B^{\mathrm{T}}$
   (c) $A(B+C) = AB + AC$
   (d) $(B+C)A = BA + CA$
   (e) $(A^{\mathrm{T}})^{\mathrm{T}} = A$

2. $\begin{bmatrix} 19 & 2 & -9 \\ -4 & -1 & 2 \\ -2 & 0 & 1 \end{bmatrix}$ 之反矩陣為何？

3. $\begin{cases} x_1 + x_2 + 2x_3 + x_4 = 5 \\ 2x_1 + 3x_2 - x_3 - 2x_4 = 2 \\ 4x_1 + 5x_2 + 3x_3 = 7 \end{cases}$ 之解為何？

4. 設 $T{:}R^2 \to R^2$ 為一單位轉換，若 $\beta=\{(1,0),(0,1)\}$ 與 $\gamma=\{(1,1),(-1,1)\}$ 分別為 R^2 的兩組有序基底，若有一 R^2 中的向量 $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$，試求經過座標轉換後的座標為何？

5. $\begin{bmatrix} -2 & 1 \\ 7 & 2 \end{bmatrix}$ 之特徵值與特徵向量各為何？

6. 試利用全微分估計 $\sqrt{(2.98)^2 + (4.01)^2}$。

7. 若 $f(x)=\begin{cases} x^2 - x, x \le 2 \\ 2x - 2, x > 2 \end{cases}$，試判斷 $f(x)$ 在 $x=2$ 處可不可微。

8. 試求 $\lim_{n \to \infty} \frac{1}{n}[(\frac{1}{n})^6 + (\frac{2}{n})^6 + (\frac{3}{n})^6 + \cdots + (\frac{n}{n})^6]$。

9. 試求 $\int \frac{4x+16}{(x+1)^2(x-5)} dx$。

10. 已知 $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!} + \cdots$，試求 $\int_0^1 \frac{1-e^x}{x} dx$ 的近似值。（取馬克勞林級數之前 3 項即可）。

試題隨卷繳回