題號： 379
科目：財務管理與財金數學
節次： 8

國立臺灣大學 107 學年度碩士班招生考試試題

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※ 注意：全部題目均請作答於試卷內之「非選擇題作答區」，請標明題號依序作答。

第一部份 財務管理

Section A: Multiple Choice Questions (3'*6=18')

A-1. Firm ABC just decided to issue new stock to raise capital. What signal will most likely be sent the market?

A. Bond markets are overpriced.

B. Bond markets are underpriced.

C. Stock price is too low.

D. Stock price is too high.

A-2. Firm XYZ is expected to have EPS of $3.00 in the coming year. The expected ROE is 16%. An appropriate required return on the stock is 12%. If the dividend payout ratio is 40%, then the intrinsic value of the stock is close to:

A. $32.14.

B. $30.00.

C. $10.00.

D. $50.00.

A-3. A major advantage to the use of debt is the tax benefit. However, debt will also put pressure on the firm to

A. meet interest and principal payments. If not, the company might be put into financial distress.

B. make dividend payments. If not, the company might be put into financial distress.

C. make dividend payments, which if not met can put the company into financial distress; and to meet both interest and dividend payments, which when met increase the firm cash flow.

D. meet both interest and dividend payments, which when met increase the firm cash flow; and to meet increased tax payments, thereby increasing firm value.

見背面

A-4. Modigliani and Miller's Proposition 1 states that

A. the market value of any firm is independent of its capital structure.

B. the market value of a firm's debt is independent of its capital structure.

C. the market value of a firm's common stock is independent of its capital structure.

D. None of the options are correct.

A-5. A firm has a WACC of 9.375%, a pretax cost of debt of 5%, a cost of equity of 12%, and a marginal corporate income tax rate of 35%. What percent of the firm is financed with equity?

A. 50%

B. 60%

C. 70%

D. None of the above

A-6. Three years ago you purchased a bond for $971.55. The bond had three years to maturity, a coupon rate of 9%, paid annually, and a face value of $1,000. Each year you reinvested all coupon interest at the prevailing reinvestment rate shown in the table below. Today is the bond's maturity date. The realized compound yield on the bond is close to: (Please round to two decimals while calculating.)

Time	Prevailing Reinvestment Rate
0 (purchase date)	5%
1	8.6%
2	8.2%
3 (maturity date)	7.2%

A. 14.67%

B. 11.91%

C. 12.35%

D. 10.00%

E. 13.57%

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Section B. Short Questions (32')

B-1: If the semiannual yield to maturity (YTM) for an investment is 3.92%. then what is its effective annual yield (EAY)? (4')

B-2: Please briefly illustrate how you would use the Fama-French three-factor model to estimate the cost of equity for a firm. (Please demonstrate your answer with equation in FOUR SENTENTCES OR LESS. Each sentence should be longer than 20 words. Otherwise, your answer may not get credit.) (6')

B-3: Does it make sense that holding a U.S. Treasury bill will always provide returns lower than those of the S&P 500 index? (Please provide brief answer in TWO SENTENTCES OR LESS. Each sentence should be NO longer than 20 words. Otherwise, your answer may not get credit.) (6')

B-4: Does it make sense that in a competitive securities market, successive price changes are random? (Please briefly explain your answer in FIVE SENTENCES OR LESS. Each sentence should be NO longer than 20 words. Otherwise, your answer may not get credit.) (8')

B-5: Suppose firm XYZ's common stock is priced at $130 a share. One of the call options of firm XYZ with the striking price of $160 and six months to expiration is quoted at $0.05. Why do you suppose investors would be willing to purchase a call that is so far out of the money? (Please briefly explain your answer in FOUR SENTENCES OR LESS. Each sentence should be NO longer than 20 words. Otherwise, your answer may not get credit.) (8')

見背面

第二部份 財金數學

A. 單一選擇題 （您可以選擇不答，就不會有倒扣，但請記得每題答錯會倒扣 4 分!!!）

以下符號各指的是： $N(\cdot)$ 為零空間（null space）、 $dim(\cdot)$ 為維度（dimension）、 $CS(\cdot)$ 為行空間（column space）、 $RS(\cdot)$ 為列空間（row space）、 $tr(\cdot)$ 為跡（trace）、 $det(\cdot)$ 為行列式值（determinant）、 $rank(\cdot)$ 為秩（rank）

1. (6%) 設 A 為一實數矩陣(不必為方陣)。關於下列敘述：
   甲： $N(A^T) = N(AA^T)$ 。
   乙： $dim(RS(A)) = dim(CS(A^TA))$ 。
   丙： $N(A)$ 與 $CS(A^TA)$ 互為正交補集。
   丁： $RS(A) = RS(A^TA)$ 。
   其正確的有？

   (A)恰一個正確 (B)恰兩個正確 (C)恰三個正確 (D)四個皆正確
   (E)四個皆不正確。

2. (6%) 請問下列二元二次方程式的幾何圖形為何？
   $$52x^2 + 72xy + 73y^2 - 160x - 130y - 25 = 0$$
   (A)橢圓 (B)雙曲線 (C)拋物線 (D)兩相交直線 (E)以上皆非。

3. (6%) 設 A 為四階實數方陣有特徵值為 $-3, 0, 2, 3$ ，關於下列敘述：
   甲： $dim(N(AA^T)) = 1$ 。
   乙： $rank(A^2 + A + I) = 4$ 。
   丙： $det((A - I)^{-1}(A + 2I)^T) = -5$ 。
   丁： $tr((A + 3I)(A + I)) = 42$ 。
   其正確的有？

   (A)恰一個正確 (B)恰兩個正確 (C)恰三個正確 (D)四個皆正確
   (E)四個皆不正確。

接次頁

4. (7%) 在一期市場模型中，假設有三個不同資產 S_1、S_2、S_3，其現貨價格分別為3,6,4，且未來有三個可能的狀態，已知其支付矩陣(payoff matrix)描述如下：

	狀態 1	狀態2	狀態3
S_1	4	2	3
S_2	10	7	4
S_3	6	5	3

在無套利原則之下，請問此市場之無風險投資組合(即未來不論何種狀態發生皆支付1元)，其現在的價格為多少？

(A) $\frac{31}{32}$　(B) $\frac{30}{32}$　(C) $\frac{29}{32}$　(D) $\frac{28}{32}$　(E) $\frac{27}{32}$

B. 計算題
請解下列 2 題微分方程，務必清楚表示求解過程

1. (15%) 試解 $\dfrac{\partial^2 U}{\partial t^2} = a^2 \dfrac{\partial^2 U}{\partial x^2} - k\delta\left(t - \dfrac{x}{v}\right)$ ，$U(0,t) = 0$ ，$U(x,0) = 0$ ，$U_x(x,0) = 0$。其中 a, k, v 皆為常數。若 $z \neq 0$ 則 $\delta(z) = 0$，且 $\int_{-\infty}^{\infty} \delta(z)dz = 1$。

2. (10%) 試解 $y'' + (\sin x)y = e^{x^2}$。

試題隨卷繳回