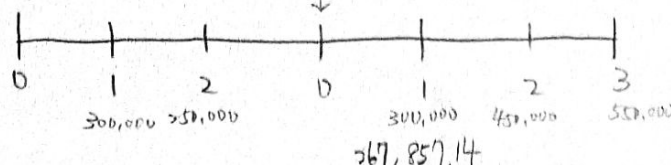


- ✧ 計算題務必寫出過程、使用千分位符號(,)以及小數點標示清楚
- ✧ 若題目沒有特別說明，請計算至小數點以下第 2 位，第 3 位四捨五入。表示方式如 1,234.56，78.09%。
- ✧ 滿分 120 分

1. (25分) Web Cites Research projects a rate of return of 15 percent on new projects. Management plans to plow back 30 percent of all earnings into the firm. Earnings this year will be \$2 per share, and investors expect a 10 percent rate of return on the stock.
- (1). (6分) What are the growth rate, stock price, P/E ratio and the present value of growth opportunities?
 $g = \frac{30}{100} \times \frac{15}{100} = 4.5\%$ $P/E = 12.173$
 $P = \frac{1.4}{0.055} = 25.45$ $D = 2 \times 0.7 = 1.4$ $g = 0$
- (2). (2分) What would the price and P/E ratio be if the firm paid out all earnings as dividends?
 $D = 1.4$ $14/2 = 7$
 $\frac{1.4}{0.1} = 14$
- (3). (2分) What do you conclude about the relationship between growth opportunities and P/E ratios? 當公司有成長率(代表其有保留餘去投資)、投資人看好, 本益比高。
- (4). (3分) Now suppose that Web Cites Research projects a rate of return of 10% on new projects, earnings this year will be \$2 per share, and investors expect a 10 percent rate of return on the stock. Find the price and P/E ratio in these circumstances. Assume a 70% payout ratio.
 $g = 0.13 \times 0.1 = 0.03$
 $D = 2 \times 0.7 = 1.4$ $P = \frac{1.4}{0.07} = 20$ $P/E = 10$
- (5). (3分) Please compare (2) and (4). Explain it. $P = 20$
- (6). (4分) Now suppose that instead of plowing money back into investment projects, Web Cites Research's management is investing at an expected return on equity of 8 percent. Find the growth rate of dividends and earnings, the price and P/E ratio in these circumstances. Assume a 70% payout ratio.
 $g = 0.13 \times 0.08 = 0.024$
 $D = 2 \times 0.7 = 1.4$ $P = \frac{1.4}{0.07} = 20$ $P/E = 10$
- (7). (5分) Find the new value of its investment opportunities. Explain why this value is negative despite the positive growth rate of earnings and dividends. If you were a corporate raider, would Web Cites Research be a good candidate for an attempted takeover? Why
 $25 - 14 > 0$
 N, 其是滿正
2. (10分) Sunny公司兩年前採行一個五年方案，經過財務經理評估後發現這個五年方案的第一年~第五年的現金流量分別是300,000、250,000、300,000、450,000、550,000且NPV>0，所以決定投資。不過現在財務經理發現若此時終止投資並處分資產，約可得1,500,000元，請問是否應終止投資？假設資金成本為12%。



$$358,737.24$$

$$391,479.14$$

$$1,018,073.52 < 1,500,000 \quad \text{應終止}$$

$$481,926.48 > 0 \quad NPV > 0$$

3. (8分) Orchid Biotech Company is evaluating several development projects for experimental drugs. Although the cash flows are difficult to forecast, the company has come up with the following estimates of the initial capital requirements and NPVs for the projects. Given a wide variety of staffing needs, the company has also estimated the number of research scientists required for each development project (all cost values are given in millions of dollars).

Project Number	Initial Capital	Number of Research Scientists	NPV	PI
I	\$10	2	\$10.1	5.05
II	15	3	19.0	6.33
III	15	4	22.0	5.5
IV	20	3	25.0	8.33
V	30	12	60.2	5.07

- (1). (4分) Suppose that Orchid has a total capital budget of \$60 million. How should it prioritize these projects? IV I II III.

- (2). (4分) Suppose in addition that Orchid currently has only 12 research scientists and does not anticipate being able to hire any more in the near future. How should Orchid prioritize these projects? IV I II III.

4. (15分) Consider the following bonds:

Bond	Coupon Rate (annual payments)	Maturity (years)	7%	6%	$\frac{6-7}{7}$
A	0%	16	33,873	39,3639	16.21%
B	0%	12	44,401	49,6968	11.93%
C	2%	16	52,7673	59,5772	12.91%
D	7%	12	100,001	108,3802	8.38%

- (1). (10分) What is the percentage change in the price of each bond if its yield to maturity falls from 7% to 6%?

- (2). (5分) Which of the bonds A-D is most sensitive to a 1% drop in interest rates from 7% to 6% and why? Which bond is least sensitive? Provide an intuitive explanation for your answer.

A. 最敏感

未來現金流折現率較大

D. 最不敏感

5. (10分) Consider a portfolio of N assets. Assume all securities possess the same variance V and covariance V/3. All securities are equally weighted in the portfolio. Please show the systematic risk and unsystematic risk. Why doesn't diversification eliminate all risk? Please explain it.

$$\begin{aligned} \sigma_p^2 &= \sum_{i=1}^n w_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij}, i \neq j \\ &= \frac{1}{n^2} \sum_{i=1}^n \sigma_i^2 + \frac{1}{n^2} \sum_{i=1}^n \sum_{j=1}^n \sigma_{ij} \\ &= \frac{1}{n^2} \cdot n \cdot v + \frac{1}{n^2} (n^2 - n) \frac{v}{3} \end{aligned}$$

$$\begin{aligned} &= \frac{v}{n} + \frac{(n-1)}{n} \frac{v}{3} \\ &= \frac{nv + v(n-1)}{3n} = \frac{v(n+2)}{3n} \end{aligned}$$

$$\lim_{n \rightarrow \infty} \frac{v(n+2)}{3n} = \frac{v}{3}$$

當 $n \rightarrow \infty$, 仍有 $\frac{v}{3}$ (系統風險無法分散)

6. (20分) Orange公司現在正考慮建構新的生產線的投資計畫，這個生產線的機器設備將建在公司某個工廠內的閒置空間，公司去年花了\$700,000整理這個閒置空間。這個空間如果租給其他公司，每年可賺租金\$200,000(稅前)。機器設備購買成本為\$4,000,000，安裝和試車費用為\$500,000。公司尚須在計畫之初增加\$200,000的存貨、增加\$100,000的應收帳款，在同時應付票據也增加\$50,000。淨營運資金假設計畫結束時全部回收。公司預計機器設備能使用3年，採直線折舊法，會計殘值為0，但是公司的生產部門認為該機器設備在3年後的市場價值為\$100,000。公司預估未來3年中，這台機器設備每年可以為公司帶來\$4,000,000的利潤(稅前息前利潤)。為了這個投資計畫，公司必須舉債\$1,000,000，利息費用預估每年為\$50,000，公司稅率為40%。

- (1). (9分) 估計計畫的期初投資現金流量、各年度營運現金流量及期末現金流量。
- (2). (8分) Orange公司的負債佔權益的比例為三分之一，Orange公司權益的 β 為1.2，Orange公司負債的 β 為0.8，證券市場投資組合的預期風險溢酬為10%，無風險利率為5%，公司稅率為40%，皆符合證券市場線(SML)的假設。Orange公司這項投資計畫的風險和公司整體的風險相同，則此投資計畫的加權平均資金成本(WACC)為多少？
- (3). (3分) 請問此計畫的淨現值(NPV)=？該公司是否可採行此計畫？為什麼？

7. (20分) Apple公司擁有下列最適的資本結構

負債	\$100,000,000	25%
特別股	60,000,000	15%
普通股權益	240,000,000	60%
總計	\$400,000,000	

該公司預期本年度可以有\$60,000,000的稅後淨利，他的股利支付率為40%，稅率為40%。投資者預期該公司的盈餘與股利的成長率為9%。此公司去年支付股利為\$3.6，而普通股目前的售價為\$60。

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Apple 公司能夠經由下列方式得到新資金

60. (一). 普通股：當新普通股的發行金額未超過\$12,000,000 時，該公司必須負擔 10% 的發行成本，但如果發行金額超過\$12,000,000 時，該公司必須負擔 20%的發行成本。

15 (二). 特別股：新特別股可以面額\$100 發行，而股利為\$10。但是當新特別股的發行金額未超過\$7,500,000 時，該公司必須負擔每股\$5 的發行成本，但如果發行金額超過\$7,500,000 時，該公司必須負擔每股\$10 的發行成本。

25 (三). 負債：未超過\$5,000,000 的新債其利率為 10%，介於\$5,000,001 到\$10,000,000 的新債其利率為 12%，超過\$10,000,000 的新債其利率為 14%。

此外，Apple 公司還擁有下列投資機會

40%

投資計畫	成本	年度現金流量	計畫壽命	內部報酬率
A	\$10,000,000	2,191,200	7	12%
B	\$20,000,000	3,154,420	5	18%
C	\$10,000,000	2,170,180	8	14%
D	\$10,000,000	3,789,480	10	13%
E	\$20,000,000	5,427,840	6	16%

(1). (5分) 找出Apple公司的資金突破點。

(2). (9分) 請估計各個不同突破點的WACC

(3). (6分) 此公司應接受那些計畫？Why？

8. (12分) Apple公司股票的預期報酬率與報酬率標準差分別為12%與20%、Orange公司股票的預期報酬率與報酬率標準差分別為8%與10%、Banana公司股票的預期報酬率與報酬率標準差分別為4%與3%。假設Apple與Orange這兩種股票的報酬率相關係數為0.25、Apple與Banana這兩種股票的報酬率相關係數為 -0.08、Orange與Banana這兩種股票的報酬率相關係數為0.15。

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- (1). (4分) 假如某投資人將所有資金的60%投資Apple公司股票，30%投資Orange公司股票，其餘資金投資Banana公司股票，請求出此投資組合的預期報酬率與報酬率標準差的值。
- (2). (8分) 若有一個Pineapple公司股票的預期報酬率與報酬率標準差分別為9%與12%，假設Pineapple、Banana這兩種股票的報酬率相關係數為-1。若投資人希望建構一個由Pineapple、Banana這兩種股票所組成最低風險的投資組合，應各投資多少比例的資金在這兩種股票？並計算此最低風險的投資組合的預期報酬率與報酬率標準差。

$$\therefore r_{P/B} = 0.1 \times 9\% + 0.9 \times 4\% = 0.1 = 10\%$$