第一大題

(1) 6分

- (1分) Growth rate = 30% * 15% = 4.5%
- (2分) Price = (2*0.7)/(0.1-0.045) =$ 25.45
- (1分) P/E ratio = 25.45/2 = 12.73
- (2分) PV of growth opportunities = 25.45–2/0.1 = 25.45–20 =5.45

(2) 2分

- (1分) Price = 2/0.1 = $20
- (1分) P/E ratio = 20/2 = 10

(3) 2分

- 因為投資機會(預期成長率)越高，投資人會較願意花更多錢去買此家股票。因此公司的成長機會與其本益比成正相關。

(4) 3分

Growth rate = 30% *10% = 3%

- (1.5分) Price = (2*0.7)/(0.1-0.03) =$20
- (1.5分) P/E ratio = 20/2 = 10

(5) 3分 **須寫出(2)(4)的內容去相比較其中差異**

股東對於公司的期望報酬率(門檻)為 10%。(2)為公司將盈餘當成股利全部發放給股東，使其自行投資;(4)為公司保留部分盈餘投資於報酬率為 10%的新方案上。公司將盈餘當作股利發放給股東其自行投資所能獲得的報酬率與公司將盈餘保留下來投資新方案的報酬率相同，因此兩者的股價相同。

(6) 4分

- (1分)Growth rate = 8% *30% = 2.4%
- (2分)Price = (2*0.7)/(0.1-0.024) = $18.42
- (1分)P/E ratio = 18.42/2 = 9.21

(7) 5分

- New value of investment opportunities = 18.42 – 20 = 1.58 (1分)
- 解釋：公司投資於新方案的成長率雖然為正(8%)，但是股東期望公司所能為其賺得的報酬率門檻為 10%，並未達到股東的要求。因此若公司將盈餘保留下來僅能為股東賺至其門檻以下之報酬，那麼股東情願公司將盈餘全部當作股利發放，股東將自行去做更為有利的投資。(2分)

- 是一個好的接管目標。(1分)
- 解釋：接管公司可以每股$18.42 取得公司大量股票，得到控制權後再將公司盈餘當作股利全數發放給股東，股價將回升至每股$20，立刻獲利$1.58。(1分)

第2題

300,000 x PVIF12%,1 + 450,000 x PVIF12%,2 + 550,000 x PVIF12%,3

= 300,000 x 0.8929 + 450,000 x 0.7972 + 550,000 x 0.7118
= 1,018,000 < 1,500,000 應終止投資

第3題

Project	PI	NPV/Headcount
I	1.01	5.1
II	1.27	6.3
III	1.47	5.5
IV	1.25	8.3
V	2.01	5.0

a. The PI rule selects projects V, III, II. These are also the optimal projects to undertake (as the budget is used up fully taking the projects in order).

b. The PI rule using the headcount constraint alone selects IV, II, III, I, and V, because the project with the next highest PI (that is NPV/Headcount), V, cannot be undertaken without violating the resource constraint. These projects are also feasible to do under the current capital budget because they happen to require exactly $60 million in capital. The only other feasible possibility is to take only project V, which generates a lower NPV, so this choice of projects is optimal.

a. What is the percentage change in the price of each bond if its yield to maturity falls from 7% to 6%?

b. 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. We can compute the price of each bond at each YTM using Eq. 6.5. For example, with a 7% YTM, the price of bond A per $100 face value is

$$\text{P(bond A, 7\% YTM)} = \frac{100}{1.07^{16}} = \$33.87.$$

The price of bond D is

第4題

第5題

$$\text{P(bond C, 7\% YTM)} = 2\times\frac{1}{0.07}\left(1-\frac{1}{1.07^{16}}\right)+\frac{100}{1.07^{16}} = \$52.77.$$

One can also use the Excel formula to compute the price: –PV(YTM, NPER, PMT, FV).

Once we compute the price of each bond for each YTM, we can compute the % price change as

$$\text{Percent change} = \frac{(\text{Price at 6\% YTM})-(\text{Price at 7\% YTM})}{(\text{Price at 7\% YTM})}.$$

The results are shown in the table below.

Bond	Coupon Rate	Maturity	Price at 7%	Price at 6%	Change
A	0%	16	$33.87	$39.36	16.2%
B	0%	12	$44.40	$49.70	11.9%
C	2%	16	$52.77	$59.58	12.9%
D	7%	12	$100.00	$108.38	8.4%

b. Bond A is most sensitive, because it has the longest maturity and no coupons, so its future cash flows have the highest discount factors. Bond D is the least sensitive. Intuitively, higher coupon rates and a shorter maturity mean that relatively more of the bond's cash flows happen early and thus cannot be as greatly affected by changes in interest rates as bonds with low coupon rates and longer maturities.

1 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 prove it.

$$\omega = \frac{1}{\mathrm{N}}$$

$$\sigma_p^2 = \sum_{i=1}^{n} \omega_i^2 \sigma_i^2 + \sum_{i=1}^{n} \sum_{j=1}^{n} \omega_i \omega_j \sigma_{ij} \quad , i \neq j$$

$$= (\frac{1}{N})^2 \sum_{i=1}^{n} \sigma_i^2 + (\frac{1}{N})^2 \sum_{i=1}^{n} \sum_{j=1}^{n} \sigma_{ij}$$

$$= \frac{1}{N^2} \cdot N \cdot V + \frac{1}{N^2}(N^2 - N)\frac{V}{3}$$

$$= \frac{\mathrm{V}}{\mathrm{N}} + \frac{N^2 - N}{N^2} \cdot \frac{V}{3}$$

$$= \frac{\mathrm{V}}{\mathrm{N}} + \frac{N - 1}{N} \cdot \frac{V}{3}$$

$$= \frac{2V + NV}{3N}$$

$$= \frac{V(N+2)}{3N}$$

$$\lim_{\mathrm{n}\to\infty} \frac{V(N+2)}{3N} = \frac{V}{3}, \text{ as } \mathrm{n}\to\infty, \frac{V}{3} \text{無法完全分散}$$

第6題

108 財管期末考

6. (1) 期初 CF:

設備	(4,500,000)	(-4,000,000 - 500,000) 成本 試車Exp.
淨營運資金	(250,000)	(-500,000 - 100,000 + 50,000) Inventory A/R A/P
	(4,750,000) 3	

營運 CF:

	1	2	3
稅前息前利潤	4,000,000	4,000,000	4,000,000
-稅(40%)	(1,600,000)	(1,600,000)	(1,600,000)
稅後淨利	2,400,000	2,400,000	2,400,000
+折舊	1,500,000	1,500,000	1,500,000
OFC	3,900,000 1	3,900,000 1	3,900,000 1

期末 CF

淨營運	250,000
處分	100,000
稅影響數	(40,000)
	310,000 3

售 BV
100,000 - 0 = 100,000 利潤 (profit)
100,000 × 40% = 40,000 (-)

(2) 負債:權益 = 1:3 → 風險溢酬

$ER_i = r_f + \beta(ER_m - r_f)$ → 計算 r_D, r_E $r_D = 0.13$ ↗ $r_E = 0.17$ ↗

$WACC = \frac{1}{4} \times (5\% + \underset{\beta_D}{0.8} \times 10\%)(1-40\%) + \frac{3}{4}(5\% + \underset{\beta_E}{1.2} \times 10\%) = 14.7\%$ 4

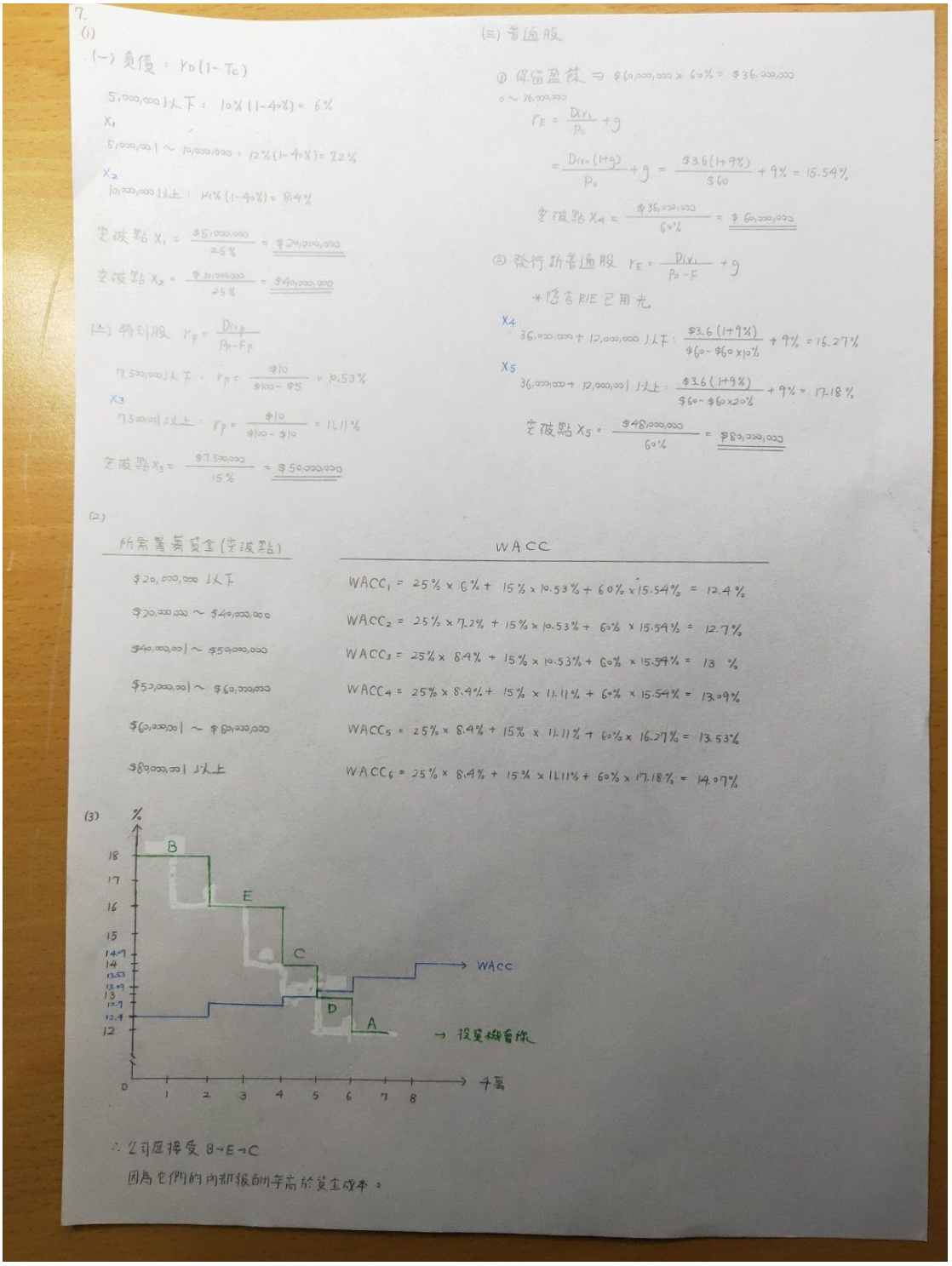
) $NPV = -4{,}750{,}000 + \frac{3{,}900{,}000}{(1+14.7\%)} + \frac{3{,}900{,}000}{(1+14.7\%)^2} + \frac{3{,}900{,}000 + 310{,}000}{(1+14.7\%)^3}$ → 4,210,000

$= -4{,}750{,}000 + 3{,}400{,}174.37 + 2{,}964{,}406.60 + 2{,}789{,}920.59$

$= 4{,}404{,}502 > 0$ 執行此方案 ∵ NPV > 0

2 0.5 0.5

第7題



第8題

(1) 預期報酬率 ERp=10% 報酬率標準差=0.1317 or 13.18%

(2) 投資20%在Pineapple，80%在Banana

預期報酬率 ERp=5% 報酬率標準差=0