



Chapter 1 Time Value of Money



Multiple-Choice Questions

Section 1.1

1. C $FV = \$80,000 \times (1 + 3.5\%)^3 = \$88,697$
2. D $FV = \$2,000 \times (1 + 5\%)^3 + \$2,000 \times (1 + 5\%)^2 + \$2,000 \times (1 + 5\%) = \$6,620.25$
3. A $PV = \$40,000 \div (1 + 3\%)^4 = \$35,539.48$
4. A The return of (A) is $\$10,000 \times 1.05 \times 1.05 \times 1.05 = \$11,576.25$
The return of (B) is $\$10,000 \times 1.06 \times 1.05 \times 1.04 = \$11,575.2$
The return of (C) is $\$10,000 \times 1.07 \times 1.05 \times 1.03 = \$11,572.05$
The return of (D) is $\$10,000 \times 1.08 \times 1.04 \times 1.03 = \$11,568.96$
Therefore, (A) brings the highest return.
5. C
6. C
7. C (2) is incorrect. It is because future value increases as interest rate rises.

Section 1.2

8. B
9. B Net Present Value = $\frac{\$3,000}{(1 + 0.05)} + \frac{\$2,500}{(1 + 0.05)^2} - \$5,000 = \124.72
10. B
11. A Net Present Value = $\frac{\$10,000}{(1 + 0.05)} + \frac{\$10,000}{(1 + 0.05)^2} - \$20,000 = -\$1,405.9$
12. B
13. A

Section 1.3

14. C Effective rate of return of (A) is 19.25%.
Effective rate of return of (B) is 19.9%.
Effective rate of return of (C) is 21.94%.
Effective rate of return of (D) is 21%.
15. D Half-monthly compounding means a frequency of 24 compounding in a year.
16. A (3) is incorrect. It is because nominal rate of return will not increase as frequency of compounding increases.
17. A Effective rate of return of Scheme A is 12%.
Effective rate of return of Scheme B is 12.36%.
Effective rate of return of Scheme C is 12.01%.
Effective rate of return of Scheme D is 12.13%.



18. D $FV = \$8,000 \times (1 + 0.02)^6 = \$9,009.3$
19. D
20. B (1) is incorrect. It is because the bank's declared interest rate is the nominal rate of return.
(2) is incorrect. It is because yearly compounding means identical nominal and effective rates of return.

Short Questions

Section 1.1

1. Return of Plan I = $\$50,000 \times (1 + 5\%) \times (1 + 6\%) \times (1 + 7\%) - \$50,000$ (1) = \$9,545.5 (1)
Return of Plan II = $\$50,000 \times (1 + 6\%)^3$ (1) = \$9,550.8 (1)
Because Plan II achieves a higher return, Peter should join Plan II. (1)
2. (a) $P \times (1 + 5\%) \times (1 + 5\%) = \$60,000$ (1)
 $P = \$54,421.77$ (1)
- (b) $\$60,000 \times (1 + r)^3 = \$68,000$ (1)
 $r = 4.26\%$ (1)
Chi Ming should invest in an investment scheme which guarantees a minimum interest rate of 4.26% p.a. (1)

Section 1.2

3. (a) Present value of Arrangement 1
 $= \frac{\$160,000}{(1 + 0.05)^3}$ (1) = \$138,214.02 (1)
- Present value of Arrangement 2
 $= \frac{\$70,000}{(1 + 0.05)} + \frac{\$60,000}{(1 + 0.05)^2} + \frac{\$40,000}{(1 + 0.05)^3}$ (1) = \$155,641.94 (1)
- (b) Mr Chan should choose Arrangement 1 because its present value of cost is lower than that of Arrangement 2. (2)
4. (a) Present value of the repayment to Bank A
 $= \frac{\$13,000}{1.1} + \frac{\$10,000}{1.1^2} + \frac{\$10,000}{1.1^3}$ (1) = \$27,595.79 (1)
- Present value of the repayment to Bank B
 $= \frac{\$10,000}{1.1} + \frac{\$13,000}{1.1^2} + \frac{\$10,000}{1.1^3}$ (1) = \$27,347.86 (1)
- Present value of the repayment to Bank C
 $= \frac{\$10,000}{1.1} + \frac{\$10,000}{1.1^2} + \frac{\$13,000}{1.1^3}$ (1) = \$27,122.46 (1)
- The present value of the repayment to Bank C is the lowest. Therefore, Mr Chau should borrow from Bank C. (1)

(b) The same amount of cash is repaid whichever bank is chosen, but borrowing from different bank yields different cash flows in different years. Borrowing from Bank C gives a greater discount and lower present value because it charges a higher amount in the final year. (2)

5. (a) Net present value is the present value of cash flow less initial investment in different times of the investment period. (1)

$$(b) \text{ Net present value} = \frac{\$40,000}{1.08} + \frac{\$30,000}{1.08^2} + \frac{\$20,000 + \$7,000}{1.08^3} - \$60,000 \quad (3)$$

$$= \$84,190.67 - \$60,000$$

$$= \$24,190.67 \quad (1)$$

(c) The positive net present value means the future revenue brought by the machine will be higher than the initial investment costs. Therefore, Mr Chung should buy the machine. (1)

(d) The licence fee pushes up the cost of capital from \$60,000 to \$90,000.

$$\text{New net present value} = \frac{\$40,000}{1.08} + \frac{\$30,000}{1.08^2} + \frac{\$20,000 + \$7,000}{1.08^3} - \$90,000$$

$$= \$84,190.67 - \$90,000$$

$$= -\$5,809.33 \quad (2)$$

The negative net present value means that the total present value of the future revenue brought by the machine will be lower than the initial investment costs, Mr Chung should not buy the machine. (2)

$$6. (a) \text{ Net present value} = \frac{\$40,000}{1.1} + \frac{\$40,000}{1.1^2} + \frac{\$40,000 + \$10,000}{1.1^3} - \$110,000 \quad (3)$$

$$= \$106,987.23 - \$110,000$$

$$= -\$3,012.77 \quad (1)$$

The negative net present value means the total present value of the truck's future cash flow will be lower than its initial investment cost. Therefore, Mr Yip should not buy the truck. (1)

(b) New net present value = \$106,987.23 - \$100,000

$$= \$6,987.23 \quad (1)$$

The positive net present value means the total present value of the truck's future cash flow will be higher than its initial investment costs. Mr Yip should buy the truck. (1)



Section 1.3

7. (a) Annualised percentage rate of Bank A = $\left[1 + \frac{12\%}{12}\right]^{12} - 1$
 = 12.68% (1)
 Annualised percentage rate of Bank B = 12.5% (1)
- (b) Interest receivable from Bank A = $\$10,000 \times 12.68\%$
 = \$1,268 (1)
 Interest receivable from Bank B = $\$10,000 \times 12.5\%$
 = \$1,250 (1)
- (c) Annualised percentage rate of Bank B = $\left[1 + \frac{12.5\%}{2}\right]^2 - 1$
 = 12.89% (2)
- (d) The higher the frequency of compounding, the more interest will be earned during the year with new interest accruing from earned interest. Under the compounding effect, the eventual return will be higher. (2)
8. (a) Nominal rate of return is declared interest rate. (1)
 Effective rate of return refers to the rate of return of interests reinvestment made within 1 year. (1)
- (b) The effective rate of return should be referred to when making decisions on investments. (1)
 It is because the effective rate of return has taken into account different frequencies of compounding. (1)
- (c) Effective rate of return (ERR) of Plan I = 26% (1)
 Effective rate of return (ERR) of Plan II = $\left[1 + \frac{25\%}{2}\right]^2 - 1 = 26.56\%$ (1)
 Effective rate of return (ERR) of Plan III = $\left[1 + \frac{24.5\%}{4}\right]^4 - 1 = 26.84\%$ (1)
 Effective rate of return (ERR) of Plan IV = $\left[1 + \frac{24\%}{12}\right]^{12} - 1 = 26.82\%$ (1)
- (d) Mr Wong should join Plan III. (1)
 It is because Plan III has the highest effective rate of return. (1)