

Faculty of Business and Economics
Finance and Banking Department
Finn 1300
Chapter five

- 1) Calculate the future value of \$4,600 received today if it is deposited at 9 percent for three years.
- 2) Calculate the present value of \$89,000 to be received in 15 years, assuming an opportunity cost of 14 percent.
- 3) Aunt Tillie has deposited \$33,000 today in an account which will earn 10 percent annually. She plans to leave the funds in this account for seven years earning interest. If the goal of this deposit is to cover a future obligation of \$65,000, what recommendation would you make to Aunt Tillie?
- 4) Colin has inherited \$6,000 from his grandmother. He would like to invest this money for two years and then use the proceeds from that investment to buy a new high-end gaming computer for \$7,000. Will Colin have enough money to buy the computer if he deposits his money in an account paying 8 percent compounded semiannually?
- 5) Congratulations! You have just won the lottery! However, the lottery bureau has just informed you that you can take your winnings in one of two ways. You can elect to receive a payment of \$1,000,000 now or a payment of \$1,750,000 in five years. Assume you can earn 5% on funds that you invest today. Which option would you choose?
- 6) Mary will receive \$12,000 per year for the next 10 years as royalty for her work on a finance book. What is the present value of her royalty income if the opportunity cost is 12 percent? Assume that payments come at the end of each year.
- 7) To pay for her college education, Gina is saving \$2,000 at the beginning of each year for the next eight years in a bank account paying 12 percent interest. How much will Gina have in that account at the end of 8th year?
- 8) You have provided your friend with a service worth \$8,500. Your friend offers you the following sequence of end-of-year cash flows instead of paying \$8,500 today. Should you accept his offer if your opportunity cost is 8 percent?

Year	Cash Flow
1	\$4,000
2	3,000
3	2,000
4	1,000

- 9) Marc has purchased a new car for \$15,000. He paid \$2,500 as down payment and he paid the balance by a loan from his hometown bank. The loan is to be paid on a monthly basis for two years charging 12 percent interest. How much are the monthly payments?
- 10) Brian borrows \$5,000 from a bank at 8 percent annually compounded interest to be repaid in five annual installments. Calculate the principal paid in the third year.

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Work Sheet (chapter 5)

1) $FV = ??$

$PV = \$4,600$

$r = 9\%$

$n = 3 \text{ years}$

$\Rightarrow FV = PV (1+r)^n$

$= 4,600 (1 + 0.09)^3$

$= 4,600 (1.09)^3$

$= \$5957,1334$

2) $PV = ??$

$FV = \$89,000$

$n = 15 \text{ years}$

$r = 14\%$

$\Rightarrow PV = \frac{FV}{(1+r)^n}$

$= \frac{89,000}{(1.14)^{15}}$

$= \$12,468,59$

3) $PV = \$33,000$

$r = 10\% \text{ annually}$

$n = 7 \text{ years}$

The goal of money = \$65,000

Recommendation ??

$FV = 33,000 (1 + 0.1)^7$

$= 33,000 (1.1)^7$

$= \$64,307.66$

There is a shortage

1) higher ~~r~~

2) longer n

3) larger deposit

(The shortage = \$65,000 - \$64,307.66 = \$692.34)

4) $n = 2 \text{ years}$

$PV = \$6,000$

Goal of the money = \$7,000

$r = 8\%$

compounded semiannually



r, n (stabilität)

$\Rightarrow n = 2 \times 2 = 4$

$r = \frac{8\%}{2} = 4\%$

$\Rightarrow FV = 6,000 (1.04)^4$

$= \$7,019.15$

\Rightarrow Colin will have enough money

(lottery : ~~available~~)

$r = 5\%$

$$PV = \$1,000,000$$

or: $n = 5 \text{ years} \Rightarrow \$1,750,000 \text{ ??}$

$$FV = 1,000,000 (1 + 0.05)^5$$

$$= \$1,276,281.563 < 1,750,000$$

\Rightarrow To wait and receive $\$1,750,000$ in 5 years.

or: $PV = \frac{1,750,000}{(1 + 0.05)^5}$ ($\$1,750,000$ di PV di awal)

$$PV = \$1,371,170.8 > 1,000,000$$

\therefore To wait and receive $\$1,750,000$ in 5 years.

[6] $CF = \$12,000 / \text{year}$

$n = 10 \text{ years}$

$PVA = ??$

$r = 12\% \Rightarrow$ at the end of each year \Rightarrow ordinary annuity

$$\Rightarrow PVA = \frac{CF}{r} \left(1 - \frac{1}{(1+r)^n} \right) = \frac{12,000}{0.12} \left(1 - \frac{1}{(1.12)^{10}} \right)$$

$$= 100,000 (0.68) \approx \$68,000$$

[7] $CF = \$2,000 / \text{year}$ (at the ~~beginning~~^{beg.} of each year) \Rightarrow $PVA \text{ due}$

$n = 8 \text{ years}$

$r = 12\%$

$$\Rightarrow FVA \text{ due} = CF \left(\frac{(1+0.12)^8 - 1}{0.12} \right) (1 + 0.12)$$

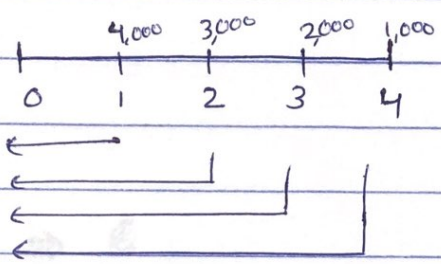
~~$PVA \text{ due} = \frac{CF}{r} \left(1 - \frac{1}{(1+r)^n} \right)$~~ $\Rightarrow FVA \text{ due} = \$27,551.31$

price = \$8,500 New or below
(PV)

$$r = 8\%$$

Year	CF
1	\$4,000
2	3,000
3	2,000
4	1,000

الفكرة : بتي اخرج صوره لل PV
(كل وحدة كمال) بعدين اجمعهم
واكارت مع 8,500 وبعدها بتقرر



مربوطين بتجمعهم اذنا بتبلغ مستأجرة -

mixed stream: متغير

$$① PV = \frac{4000}{(1.08)^1} = \$3,703.7$$

$$② PV = \frac{3000}{(1.08)^2} = \$2,572.07$$

$$③ PV = \frac{2000}{(1.08)^3} = \$1,507.66$$

$$④ PV = \frac{1000}{(1.08)^4} = \$735.02$$

$$PV = ① + ② + ③ + ④ = \$8,598.45$$

⇒ But : \$8,598.45 > \$8,500

⇒ mixed stream option is better.

loan = 15,000 - 2,500 = \$12,500 = PVA (دفعات متساوية)

↳ is to be paid on a monthly basis for 2 years

n = 2 years.

r = 12% .

monthly payment . (CF / month)

: r, n على r, n

$$r = \frac{12\%}{12} = 1\% \text{ / month}$$

$$n = 2 \times 12 = 24 \text{ month}$$

$$PVA = \frac{CF}{r} \left(1 - \frac{1}{(1+r)^n} \right)$$

$$12,500 = \frac{CF}{0.01} \left(1 - \frac{1}{(1.01)^{24}} \right)$$

$$125 = CF (0.21)$$

$$\Rightarrow CF = \$588.42$$

ملاحظة: إذا كانت r سنوية (ال frequency) r, n على r, n

annuity : لقرض على أقساط كل سنة

ordinary : لقرض كل سنة

due : بلاتو كل سنة

per year & Every year \Rightarrow annuity \rightarrow ordinary وبلاتو يكون ordinary

لأن إذا كان يتدلى بال year

قرض دائماً PVA لأنه يسددي دفعة - متساوية

loan = \$5,000

r = 8%

n = 5 years

* Calculate the principal paid in the 3rd year

~~Year~~ PVA = ??

loan amortization
schedules

المسألة الأولى

بعد أن نحسب، لنفعل إلى كل مرة نرجع إليها

$$PVA = \frac{CF}{r} \left(1 - \frac{1}{(1+r)^n} \right)$$

$$5,000 = \frac{CF}{0.08} \left(1 - \frac{1}{(1.08)^5} \right) \Rightarrow CF = \$1,252.19 \text{ / year.}$$

Year	beg. bal.	loan payment	Interest	Principal	End. bal.
1	\$5,000	\$1,252.19	\$400	\$852.19	\$4,147.81
2	4,147.81	1,252.19	331.83	920.36	*3,227.45
3	3,227.45	1,252.19	258.196	993.994	2,233.456
4	2,233.456	1,252.19	178.677	1,073.53	178.677
5	178.677	1,252.19	14.294	1,237.896	0

المفروض (أ)

* Principal = loan payment - Interest

* Ending balance = beg. bal. - principal