commerce undergraduate society

COMMERCE MENTORSHIP PROGRAM

MIDTERM REVIEW SESSION

COMM 298

PREPARED BY
Samuel Cheng

@ubccmp
@ubccmp
cmp.cus.ca

TABLE OF CONTENTS

Practice Question 1

Which of the following correctly describe a corporation? Select all that apply.

a) Shareholders under a corporation have unlimited liability for its obligations

b) Shareholders under a corporation are diverse and allow a substantial amount of capital to be raised

c) The financial manager of a corporation determines whether dividends will be paid or not

d) Usually, a shareholder who has more shares can cast more votes when electing the board of directors

e) There is a finite limit to how many owners a corporation can have as office space is never infinite

Practice Question 2

Which of the following is/are related to the field of corporate finance? Select all that apply.

a) A CEO wants to determine what capital structure (mix of debt & equity) to use next year

b) A CFO wants to determine how much to save each year for his daughter's RESP

c) A financial analyst wants to determine whether their firm should open a factory in USA given the costs

d) A financial manager wants to determine what dividend policy to use for their company's shareholders

e) A treasurer wants to determine the stocks he needs to purchase to obtain an efficient portfolio for his wife

TABLE OF CONTENTS

Practice Question 1

Which of the following best illustrates a principal-agent problem in the corporate environment?

a) Managers taking an approved one-month vacation from work to go to Europe

b) Two employees arguing over the formatting and structure of an instruction manual, reducing productivity

c) Executives pursuing non-ESG activities that enhance profitability over the ESG activities shareholders want

d) Board of directors using their lunch breaks for personal matters (e.g., checking their phones)

e) Customer Engagement director travelling overseas to conduct business meetings with stakeholders

TABLE OF CONTENTS

Practice Question 1

The main roles of a financial market constitute which of the following? Select all that apply.

a) Provides liquidity to investors who want to sell securities

b) Solves principal-agent problems within corporations as public information is encoded in the prices of stocks

c) Enables investors to determine the fair value of assets traded

d) Allows corporations to issue debt (e.g., bonds) and equity (e.g., stocks) to fund their capital projects

e) Bridges the gap between shareholder value maximization and shareholder welfare maximization

Practice Question 2

Which of the following is/are true about financial assets? Select all that apply.

a) Investors who own a stock receive periodic payments (interest and principal) from the issuer

b) Financial assets with a maturity of more than one year are sold within the money market

c) The over-the-counter market is an example of a primary financial market where bonds are sold

d) Derivatives are used as a medium to achieve shareholder welfare maximization

e) None of the above

Practice Question 3

Which of the following is/are traded on the money market? Select all that apply.

a) A Government of Canada (GOC) bond issued on Jan. 7th, 2023 and matures on Dec. 16th, 2036

b) A zero-coupon treasury bill with 8 months until maturity

c) 100 shares from Apple Inc. that have no fixed maturity date

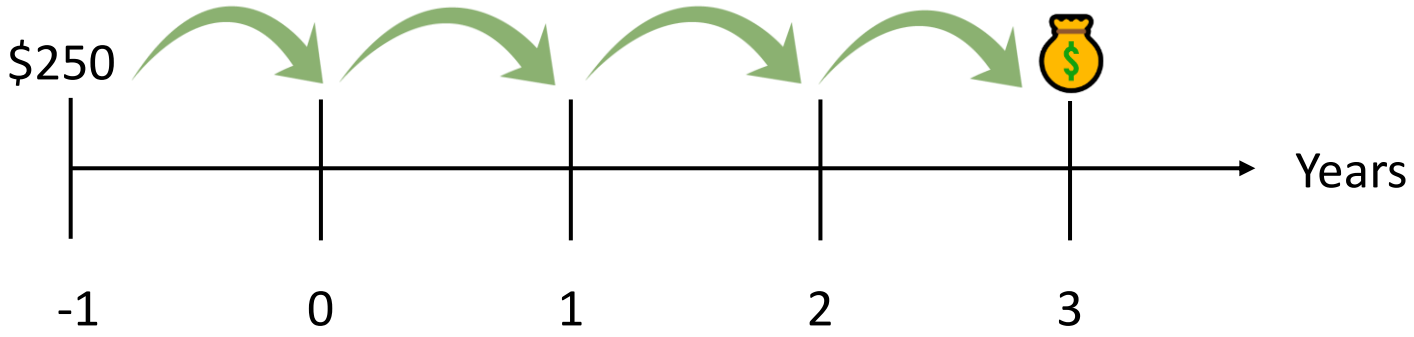
d) A commercial paper used to finance short-term liabilities

e) None of the above

TABLE OF CONTENTS

Practice Question 1

You received a $250 stipend one year ago and put it in a mutual fund that offers a yearly return of 1.7%. How much is your money worth 3 years from today?

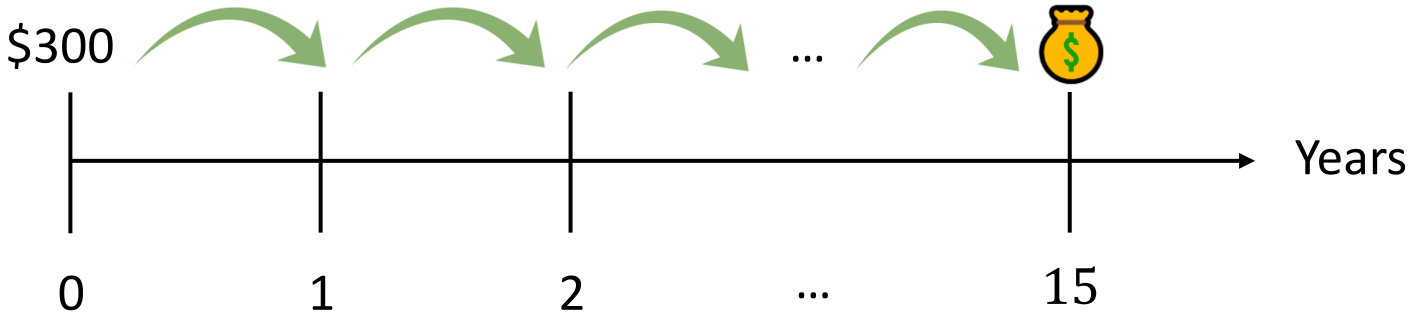


$C_{-1} = 250$ $n = 4$ $r = 0.017$

$$FV_3 = C_{-1} \cdot (1 + r)^4 \Rightarrow FV_3 = 250 \cdot (1 + 0.017)^4 = \$\mathbf{267.44}$$

Practice Question 2

Kita is a musician who mistakenly spent her money on a 6-string bass instead of a guitar. She now must save $1000 to obtain a guitar but only can put $300 in the bank today. If she can obtain a guitar in 15 years, what yearly interest rate does her bank offer?



$FV_{15} = 1000$ $C_0 = 300$ $n = 15$ $r = ?$

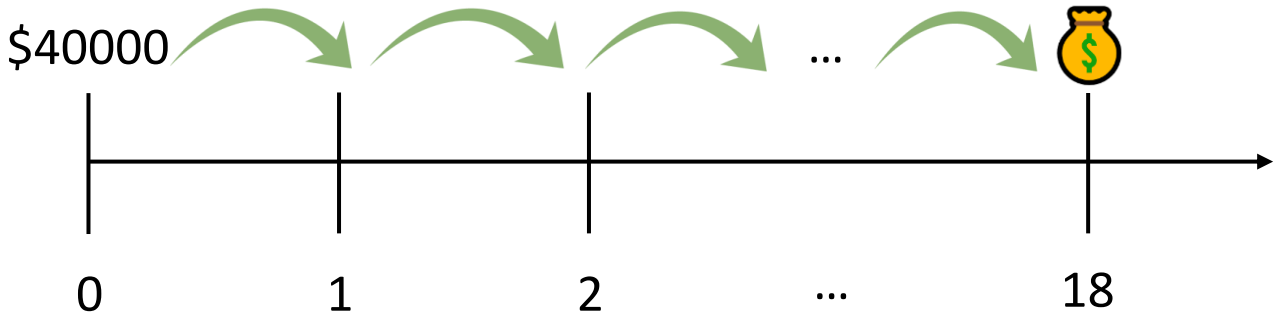
$$FV_{15} = C_0 \cdot (1+r)^n \Rightarrow 1000 = 300 \cdot (1+r)^{15}$$

$$\Rightarrow \frac{1000}{300} = (1+r)^{15} \qquad \Rightarrow \left(\frac{1000}{300}\right)^{\frac{1}{15}} = 1+r$$

$$\Rightarrow r = \left(\frac{1000}{300}\right)^{\frac{1}{15}} - 1 = \mathbf{0.0836} \quad (8.36\%)$$

Practice Question 3

A $40000 investment you own today offers a 5% rate, compounded semi-annually. If you sell this investment 18 months later, how much money would you obtain?



$n = 18$ months

Want to compound $40000 up 18 **months** so we need $r_{monthly}$

$APR = 0.05$ $\quad m = 2$ $\quad r_{semi-annual} = \frac{APR}{m} = \frac{0.05}{2} = 0.025$

1/6 of half a year is a month

$r_{semi-annual} \longrightarrow r_{monthly}$ $\quad r_{monthly} = (1 + r_{semi-annual})^{\frac{1}{6}} - 1 = (1 + 0.025)^{\frac{1}{6}} - 1 = 0.00412392$

$$FV_{18} = C_0 \cdot \left(1 + r_{monthly}\right)^{18} = 40000 \cdot (1 + 0.00412392)^{18} = \$\mathbf{43075.63}$$

Practice Question 4

A loan shark offers you $10000 at an APR rate that is compounded monthly. As a finance student, you realize this is illegal as you would have to pay him back $538972 after one year. If this is the case, what APR rate is the loan shark offering?

$m = 12$ $\quad \frac{APR}{12} = r_{monthly} \Leftrightarrow APR = 12 \cdot r_{monthly}$ Need to back out $r_{monthly}$ from r_{annual}

$r_{annual} = 52.8972$ Payback increased from $10000 to $538972 (an increase of 5289.72%)

$r_{annual} \longrightarrow r_{monthly}$ $\quad r_{monthly} = (1 + r_{annual})^{\mathbf{\frac{1}{12}}} - 1$

1/12 of a year makes up a month

$r_{monthly} = (1 + 52.8972)^{\frac{1}{12}} - 1 = 0.39411$

$APR = 12 \cdot 0.39411 = \mathbf{4.7293}$ (472.93%)

Practice Question 5

Which of the following is/are true about interest rates? Select all that apply.

a) Under annual compounding, the APR rate will always be equal to the EAR rate

b) Holding all else fixed, increasing the compounding frequency will decrease the EAR

c) The APR rate will have a greater chance at surpassing the EAR rate as we compound more frequently

d) If a bank offers an APR rate of 5% compounded monthly, then $\frac{APR}{2}$ will give us $r_{semi-annual}$

e) None of the above

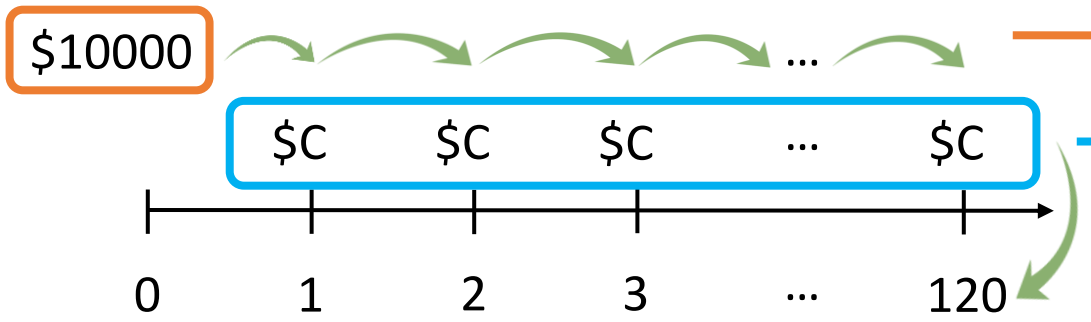
TABLE OF CONTENTS

Practice Question 1

Today your parents have $10000 in the bank gaining interest at 10% APR, compounded monthly. They recently won a lottery that rewards fixed, monthly payments at the end of each month. The payments will start this month and occur for 10 years. All winnings will be immediately deposited into the bank when received.

a) If your parents can exactly afford a $80000 car in 10 years, what is the monthly payout won from the lottery?

$r_{monthly} = \frac{APR}{m} = \frac{0.1}{12} = 0.0083333$ $n = 120$ **monthly** payments (10 years is 120 months)



$FV_{120} = 10000 \cdot (1 + 0.0083333)^{120}$

$FV_{120} = C\left[\frac{(1+0.0083333)^{120}-1}{0.0083333}\right]$

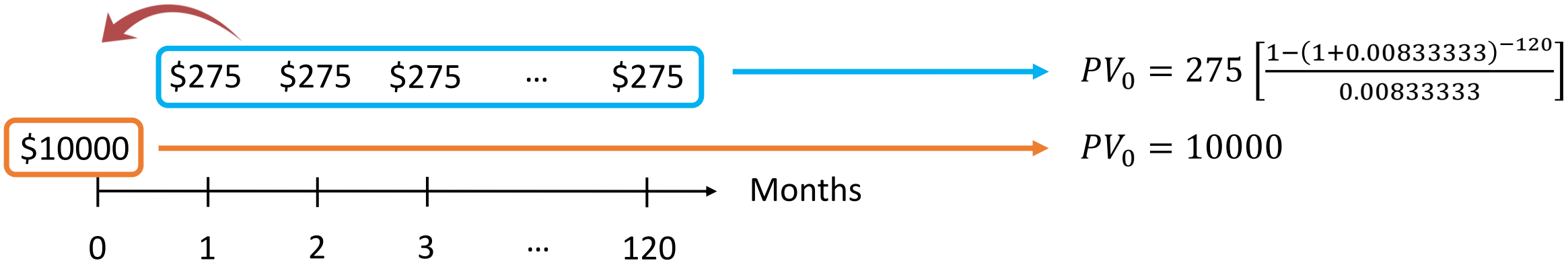
$80000 = \underbrace{C\left[\frac{(1+0.0083333)^{120}-1}{0.0083333}\right]}_{\text{FV of Lottery Annuity}} + \underbrace{10000 \cdot (1 + 0.0083333)^{120}}_{\text{FV of \$10000 in Bank}}$ $\boldsymbol{C = \$258.39}$

Practice Question 1

Assume your answer to the last question is $275

b) Suppose the lottery changes their payout scheme and awards your parents a lump-sum of cash equal to the present value of their winnings instead. What is the price of the most expensive car your parents can buy today?

$r_{monthly} = 0.00833333$ $n = 120$ months $C = 275$



$PV_0 = 275\left[\frac{1-(1+0.00833333)^{-120}}{0.00833333}\right]$

$PV_0 = 10000$

$$PV_0 = 275\left[\frac{1-(1+0.00833333)^{-120}}{0.00833333}\right] + 10000$$

PV of Lottery Annuity

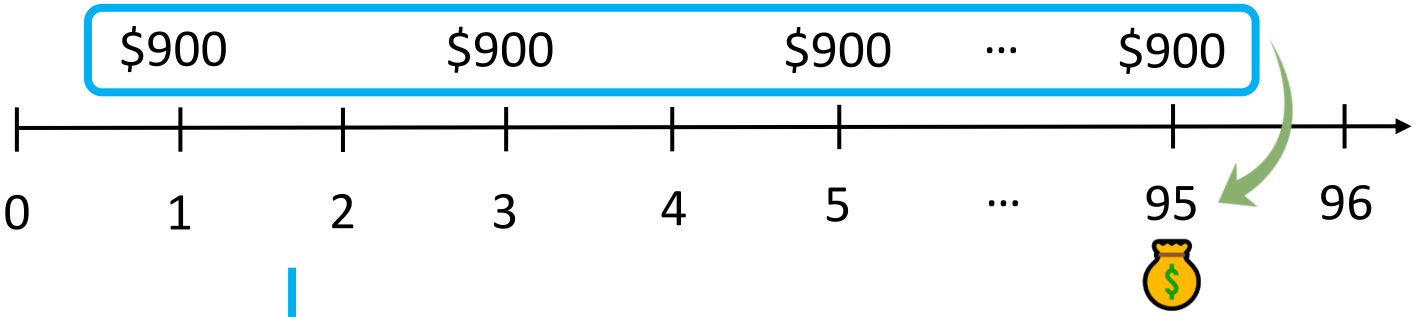
PV of $10000 in Bank

$$\boldsymbol{PV_0 = \$30809.57}$$

Practice Question 2

Your enrollment in a pension fund has landed you with an annuity of $900 every 2 months! The first payment will be a month from today on Jan. 31st, 2025 and the last payment will be on Nov. 30th, 2032. If you can reinvest all your money into a stock that gives a return of 1.48% every 2 months, how much would you have gained by the end of the 2032 (i.e., 8 years from today)?

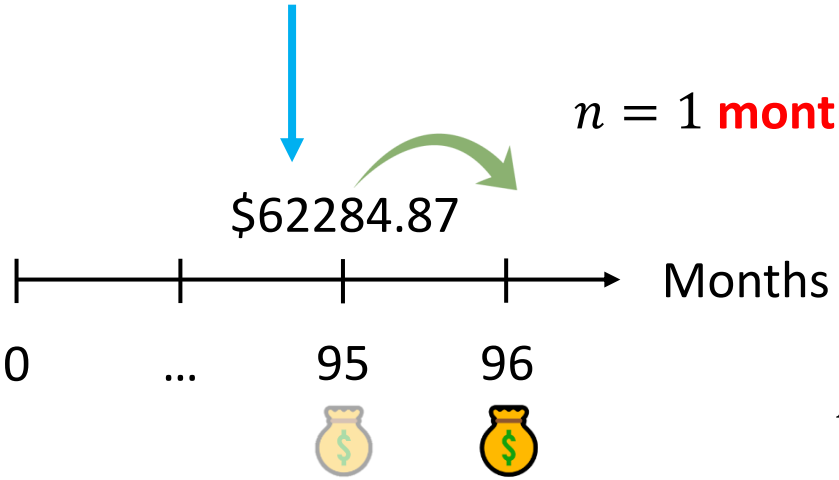
$C = 900$ $r_{bimonthly} = 0.0148$ $n = 48$ **bimonthly** payments



$$FV_{95} = 900\left[\frac{(1+0.0148)^{48}-1}{0.0148}\right]$$
$$= \$62284.87$$

$n = 1$ **month** (so we need $r_{monthly}$)

$$r_{monthly} = \left(1 + r_{bimonthly}\right)^{\frac{1}{2}} - 1$$
$$= (1 + 0.0148)^{\frac{1}{2}} - 1 = 0.007373$$



$$FV_{96} = FV_{95} \cdot (1 + r)^n = 62284.87 \cdot (1 + 0.007373)^1 = \$\mathbf{62744.10}$$

Practice Question 3

How much is a perpetuity of $75 per year starting today if the interest rate is 22% APR compounded weekly?

$C = 75$ $APR = 0.22$ $m = 52$ $r_{weekly} = \frac{APR}{m} = \frac{0.22}{52} = 0.004231$

Note: Payments are **annual** so we need to find r_{annual} (EAR)

$$r_{annual} = \left(1 + r_{weekly}\right)^{52} - 1 = (1 + 0.004231)^{52} - 1 = 0.2455$$

$$PV_0 = \frac{C}{r} + 75 = \frac{75}{0.2455} + 75 = \$380.50$$

Practice Question 4

Which of the following is/are true assuming all cash flows are positive? Select all that apply.

a) Holding all else constant, the PV of a perpetuity can never be less than the PV of an annuity

b) An example of an annuity is a consol bond

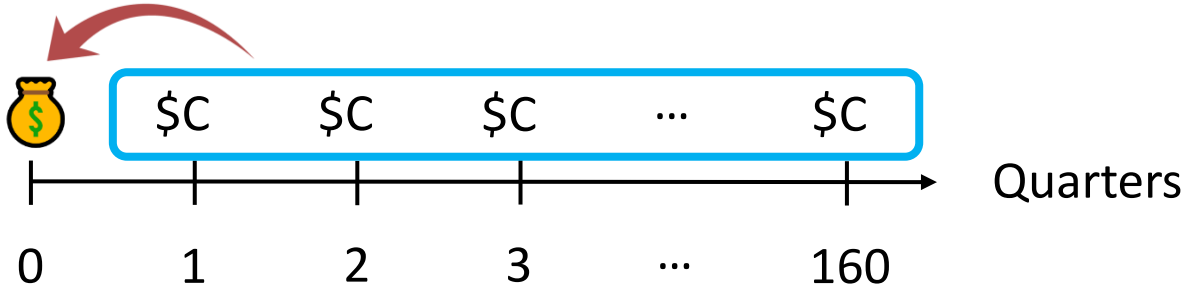
c) Holding all else constant, one would prefer a perpetuity of $300 every 2 months starting today over a perpetuity of $150 every month starting today

d) The fixed interval payments in a mortgage loan is an example of a perpetuity

e) One would prefer an annuity of $200 per year starting today under a 5% APR rate compounded semi-annually over the same annuity with annual compounding instead

Practice Question 5

a) Michael's 40-year mortgage of $650000 has a contract interest rate of 4.24% APR compounded semi-annually. He is required to make quarterly payments, with the first starting a quarter from today. Under these terms, how much will he need to pay each quarter?



$n = 160$ **quarters** (40 years is 160 quarters) $PV_0 = 650000$ $r_{semi-annual} = \frac{APR}{m} = \frac{0.0424}{2} = 0.0212$

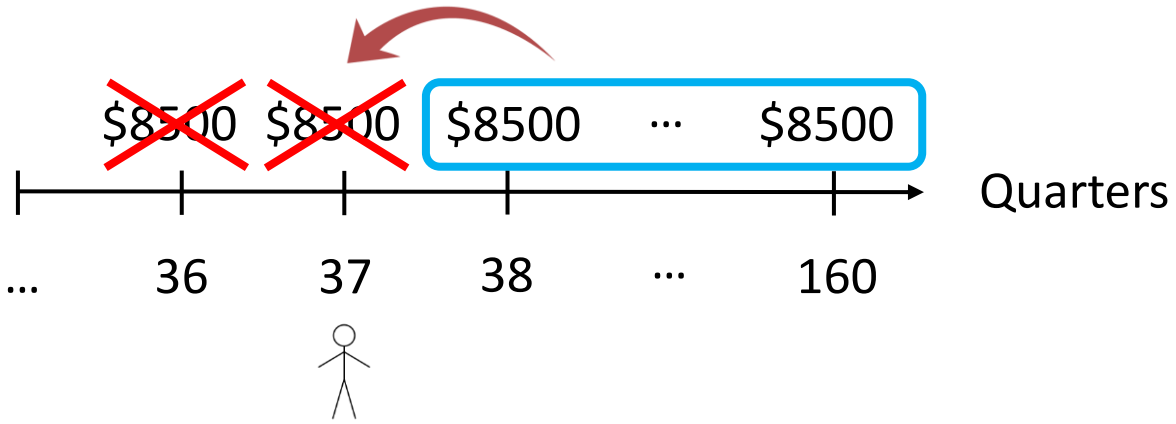
$r_{quarterly} = (1 + r_{semi-annual})^{\frac{1}{2}} - 1 = 0.0105444$ (Want $r_{quarterly}$ as payments are **quarterly**)

$PV_0 = C\left[\frac{1-(1+r)^{-n}}{r}\right] \Rightarrow 650000 = C\left[\frac{1-(1+0.0105444)^{-160}}{0.0105444}\right]$ $\boldsymbol{C = \$8427.19}$

Practice Question 5

For the rest of the question, assume that the quarterly payments are $8500 each

b) How much does Michael owe after he makes his 37th payment?



$n = 123$ **quarterly** payments (37 of 160 payments were made – 123 payments left) $r_{quarterly} = 0.0105444$

$$PV_{37} = 8500\left[\frac{1-(1+0.0105444)^{-123}}{0.0105444}\right] = \$\mathbf{584253.11}$$

Practice Question 5

For the rest of the question, assume that the quarterly payments are $8500 each

c) If $2663.18 of the 50th payment went to pay the interest, how much went to pay the principal?

$$C = Period\ Interest\ Payment + Period\ Principal\ Payment$$

$$8500 = 2663.18 + Period\ Principal\ Payment$$

$$Period\ Principal\ Payment = \$\mathbf{5836.82}$$

Practice Question 5

For the rest of the question, assume that the quarterly payments are $8500 each

d) Let's rewind time. In an alternative world, Michael realized he had trouble paying off his mortgage after he made his 37th payment. His friend offered to pay off the remaining payments if Michael gave him ownership of the house. If the house is worth $590000 today, which of the following is true? Select the best option.

i) Michael should take the offer as the PV of his house is less than the PV of his remaining payments

ii) Michael should take the offer as the PV of his house is more than the PV of his remaining payments

iii) Michael should not take the offer as the PV of his house is less than the PV of his remaining payments

iv) Michael should not take the offer as the PV of his house is more than the PV of his remaining payments

v) Michael is indifferent between the choices as the PV of both options is the same

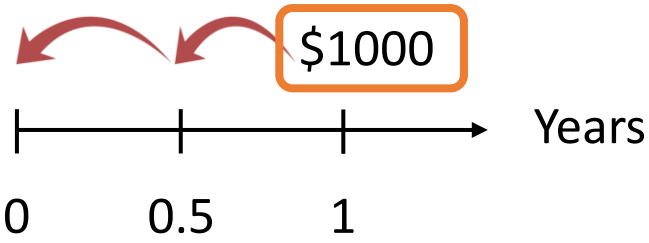
TABLE OF CONTENTS

Practice Question 1

What is the YTM of a one year, $1000 face value zero-coupon bond if it currently sells for $987.65? Assume the frequency of compounding is semi-annual.

$m = 2$ $P_0 = 987.65$ $F = 1000$

$\frac{YTM}{2} = r_{semi-annual}$ (Need to find $r_{semi-annual}$)



$P_0 = F \cdot (1 + r)^{-n}$ $n = 2$ **semi-annual** periods

$987.65 = 1000(1 + r_{semi-annual})^{-2}$ $r_{semi-annual} = 0.0062328$

$\frac{YTM}{2} = 0.0062328$ $YTM = \mathbf{0.01247}$ (1.247%)

Practice Question 2

a) A 30-year corporate bond has a YTM of 12%, a coupon rate of 9.6%, and a face value of $5000. How much money do you receive per coupon if the bond's coupon payments are yearly?

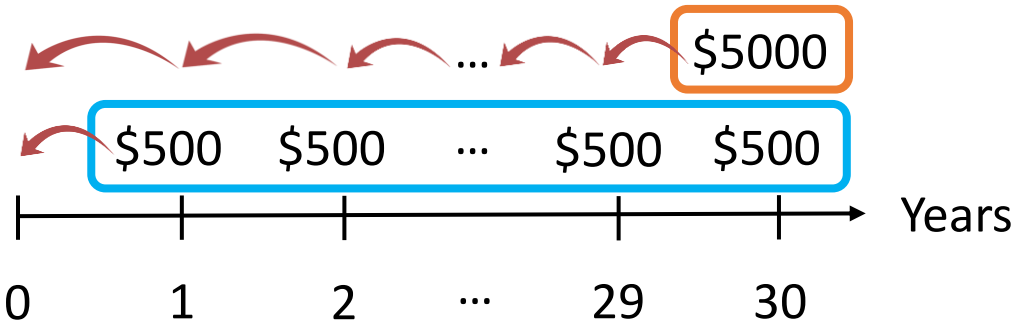
$F = 5000$ $CR = 0.096$ $k = 1$ coupon per year

$$I = F \cdot \frac{CR}{k} = 5000 \cdot \frac{0.096}{1} = \$\mathbf{480}$$

Practice Question 2

For the rest of the question, assume that the coupon payments are $500 each

b) If you bought the corporate bond today, how much would you have to pay?



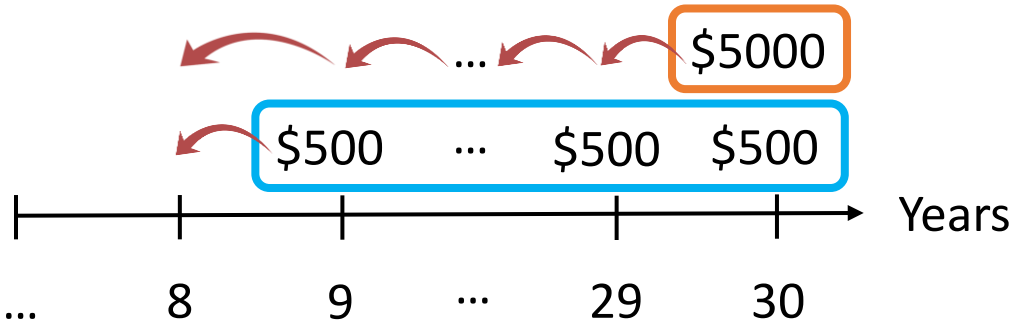
$YTM = 0.12$ $k = 1$ coupon per year $r_{annual} = \frac{YTM}{k} = \frac{0.12}{1} = 0.12$ $n = 30$ **annual** payments

$$P_0 = I\left[\frac{1-(1+r)^{-n}}{r}\right] + F \cdot (1+r)^{-n} = 500\left[\frac{1-(1+0.12)^{-30}}{0.12}\right] + 5000(1+0.12)^{-30} = \$\mathbf{4194.48}$$

Practice Question 2

For the rest of the question, assume that the coupon payments are $500 each

c) It has been a few years and you found out that your brother bought the same corporate bond 8 years ago and received his most recent coupon today. If the YTM is now 8%, how much money would he get from selling his bond right now?



$YTM = 0.12$ $k = 1$ coupon per year $r_{annual} = \frac{YTM}{k} = \frac{0.08}{1} = 0.08$ $n = 22$ **annual** payments

$$P_8 = I\left[\frac{1-(1+r)^{-n}}{r}\right] + F \cdot (1+r)^{-n} = 500\left[\frac{1-(1+0.08)^{-22}}{0.08}\right] + 5000(1+0.08)^{-22} = \mathbf{\$6020.07}$$

Practice Question 3

Which of the following is/are true about bonds? Select all that apply.

a) Holding all else constant, a zero-coupon bond would always be priced lower than a coupon-bond

b) Bonds can be traded in a primary market but not in a secondary market

c) If a bond is sold at double its face value, the price would be quoted as 100 because the selling price is 100% more than its face value

d) Treasury bills are an example of a zero-coupon bond

e) Both the coupon rate (CR) and YTM are APR rates that can fluctuate as time passes

Practice Question 4

State whether the following bonds are traded at a premium, at a discount, or at par

a) A $1234.56 corporate bond that has a face value of $1000

Premium (Selling Price > Face Value)

b) An Apple Inc. bond that offers semi-annual coupons of $44.50, has a face value of $2000, and a YTM of 4.9%

Discount $I = F \cdot \frac{CR}{k} \Leftrightarrow CR = \frac{I \cdot k}{F} = \frac{44.5 \cdot 2}{2000} = 0.0445$ (4.45% – which means $4.9\% = YTM > CR$)

c) A 7-year John Deere bond that pays semi-annual coupons, has a coupon rate of 4.7%, and offers an effective semi-annual return of 2.5%

Discount $YTM = r_{semi-annual} \cdot k = 0.025 \cdot 2 = 0.05$ (5% – which means $YTM > CR = 4.7\%$)

↳ Since coupon payments are semi-annual

Practice Question 5

a) List the following bonds' prices from smallest to largest. Each bond has the same face value and pays annual coupons.

i) 10-year bond with a coupon rate of 5% and YTM of 8%

ii) 12-year bond with a coupon rate of 9% and YTM of 8%

iii) 15-year bond with a coupon rate of 9% and YTM of 8%

iv) 8-year bond with a coupon rate of 5% and YTM of 8%

i, iv, ii, iii

b) Select the correct option listed in brackets

i) Fixing all else, a premium bond will (**increase**/decrease) in price as its maturity period becomes longer

ii) Fixing all else, a discount bond will (increase/**decrease**) in price as its maturity period becomes longer

TABLE OF CONTENTS

Practice Question 1

Suppose you are giving the following three bonds – assume all of them have a face value of $1000

i) A- grade John Deere bond with 8 years until maturity, coupon rate of 3.05%, and semi-annual coupons

ii) BBB grade WSP Global bond with 12 years until maturity, coupon rate of 2.74%, and semi-annual coupons

iii) BB grade Tesla bond with 10 year until maturity, coupon rate of 3.42%, and semi-annual coupons

a) Which bond has the highest credit risk?

Tesla bond

b) Which bond has the highest interest rate risk?

WSP Global bond

c) You found a comparable Government of Canada bond with a YTM of 7% to the Tesla bond. If the Tesla bond has a YTM of 12%, what is the default premium of the Tesla bond?

$$12\% - 7\% = \mathbf{5}\%$$

Practice Question 2

Which of the following is/are true about an inverse sloping yield curve for bonds? Select all that apply.

a) A smaller interest rate risk premium will be expected in longer maturity bonds

b) The economy is forecasted to undergo a recession

c) Interest rates are expected to rise in the future

d) Longer maturity bonds will have a smaller YTM

e) A larger interest rate risk premium will be expected in shorter maturity bonds

TABLE OF CONTENTS

Practice Question 1

Which of the following is/are true about stocks? Select all that apply.

a) As r increases, stock price increases, and as expected growth rate (g) decreases, stock price decreases

b) Companies are forced to pay dividends and can undergo legal action if they are not paid

c) The expected return on a stock with growing dividends consists of a capital gain yield and a dividend yield

d) In general, the more stocks one has, the more votes they can cast when electing the board of directors

e) The P/E valuation method focuses on using a company's historical earnings in the last 12 months

f) Companies control their expected return by adjusting the dividends they pay and future dividend growth rate

g) The ex-dividend price of a stock will never be higher than the cum-dividend price of the same stock

Practice Question 2

a) This morning, Frieren & Fern paid a yearly dividend of $10 to their shareholders. If investors require an annual return of 13% for their stock, what is their stock price today under the following yearly growth rates?

i) $g = 8\%$

$$P_0 = \frac{D_0(1+g)}{r-g} = \frac{10(1+0.08)}{0.13-0.08} = \$\mathbf{216}$$

ii) $g = -5\%$

$$P_0 = \frac{D_0(1+g)}{r-g} = \frac{10(1-0.05)}{0.13-(-0.05)} = \$\mathbf{52.78}$$

iii) $g = 14\%$

Cannot be determined (since $g \geq r$)

b) If $g = 8\%$ what is the company's cum-dividend price today?

$$P_0^{cum} = P_0^{ex} + D_0 = 216 + 10 = \$\mathbf{226}$$

Practice Question 3

Himmel Corporation offers yearly dividends to their shareholders. They just paid their shareholders $5 and are looking at a 6% annual growth in dividends for the next 2 years. Afterwards, their annual growth rate will drop to 3% forever. What is their stock price today if investors require an annual return of 8%?

a) What is the terminal value at $t = 2$?

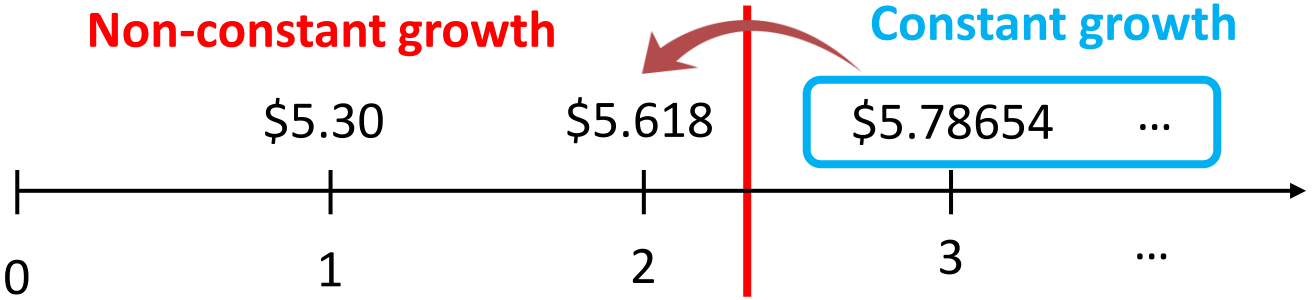
$D_0 = \$5$ (not included in P_0 as divided was *just paid*)

$D_1 = D_0 \cdot (1 + 0.06) = 5 \cdot (1 + 0.06) = \$5.30$

$D_2 = D_1 \cdot (1 + 0.06) = 5.30 \cdot (1 + 0.06) = \$5.618$

$D_3 = D_2 \cdot (1 + 0.03) = 5.618 \cdot (1 + 0.03) = \$5.78654$ (first stable growth dividend)

Stable growth rate



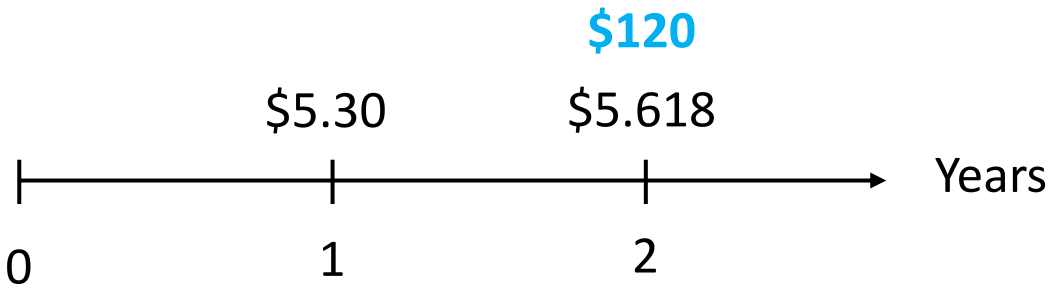
$r = 0.03$

$TV_2 = \frac{D_3}{r-g} = \frac{5.78654}{0.08-0.03} = \mathbf{\$115.73}$

Practice Question 3

For the rest of the question, assume that the terminal value is $120

b) What is the price of Himmel Corporation's stock today?



$D_1 = \$5.30$ $\quad r = 0.08$

$D_2 = \$5.618$

$$P_0 = 5.30 \cdot (1 + 0.08)^{-1} + 5.618 \cdot (1 + 0.08)^{-2} + 120 \cdot (1 + 0.08)^{-2} = \$\mathbf{112.60}$$

Practice Question 4

Stark Co. does not pay dividends but is considered similar to Eisen & Sons. Eisen & Sons estimates that their P/E ratio will be 8.7x next year.

a) If Stark Co.'s EPS is projected to be $30, what is the price of their stock today?

$P/E = 8.7$ $\qquad$ $EPS_1 = 30$

$P_0 = P/E \cdot EPS_1 = 8.7 \cdot 30 = \$\mathbf{261}$

b) Select the correct option listed in brackets

If the price of the stock is $300 today, an investor would (buy/**not buy**) it because it's (**overvalued**/undervalued)

TABLE OF CONTENTS

Practice Question 1

Which of the following statements is/are true? Select all that apply.

a) The stock return can be defined as the sum of the benchmark return and abnormal return

b) The prices of securities in a semi-strong form efficient market reflect both historical and public information

c) There is strong evidence against markets being semi-strong form efficient today

d) A market may be weak form efficient regardless of whether it is semi-strong form efficient or not

e) Data quality and superior information can cause differences in prices obtained from valuation methods

f) Information held back from a company's legal policies is an example of insider information

g) Since investor competition is less fierce over private information, prices will never adjust as time passes

Practice Question 2

Assume a semi-strong form efficient market. Your friend is a technical analyst (one who investigates past price patterns) and claims that he can predict future prices to “beat the market”. Select the option that best explains the validity of his claim.

a) Your friend is correct as a semi-form efficient market implies that one can make gains from public data

b) Your friend is incorrect as the market must be strong form efficient

c) Your friend is correct as a semi-form efficient market implies that one can make gains from historical data

d) Your friend is incorrect as prices already reflect all historical information in a semi-form efficient market

e) None of the above