CORPORATE
FINANCE

An Introduction

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Chapter 2
The Time Value of Money and Net Present Value

2.1 Our Basic Scenario: Perfect Markets, Certainty, Constant Interest Rates

2.1.1) Which of the following is *not* a necessary condition of a perfect market?
    A) no risk
    B) no taxes
    C) no transaction costs
    D) no information differences among investors

Answer: A
Diff: 1
Topic: Perfect markets

2.1.2) Which of the following is a necessary condition of a perfect market?
    A) no risk
    B) no inflation
    C) no taxes
    D) All of the above are necessary conditions for a market to be perfect.

Answer: C
Diff: 1
Topic: Perfect markets

2.1.3) What are the four assumptions that define a "perfect" market?

Answer: There are no taxes, no transaction costs, and no differences in information or opinions among investors., and there are a sufficiently large number of players in the market such that no player (or small group of players) presence or absence will affect market prices.
Diff: 1
Topic: Perfect markets

2.2 Loans and Bonds

2.2.1) Which of the following statements is *true*?
    A) An interest rate is the rate of return on a loan.
    B) All rates of return are just interest rates earned on an investment.
    C) An interest payment can have unlimited upside potential.
    D) All of the above are true statements.

Answer: A
Diff: 1
Topic: Bond terminology

2.2.2) What is the difference between an interest payment and a noninterest payment as defined in the chapter?

Answer: There is usually a specified maximum for an interest payment. Noninterest payments (such as price appreciation) have unlimited upside potential.
Diff: 1
Topic: Bond terminology

2.3 Returns, Net Returns, and Rates of Return

2.3.1) You purchased a house for $330,000 cash one year ago. You can sell it today for $277,000.
What rate of return did you earn on this investment? Round your answer to the nearest
tenth of a percent.
   A) 19.1%
   B) –16.1%
   C) 83.9%
   D) none of the above

Answer: B

Comment: $r_1 = \dfrac{C_1}{C_0} - 1 = \dfrac{\$277,000}{\$330,000} - 1 = -16.1\%.$

Diff: 1
Topic: Rate of return

2.3.2) You invested $10,000 in a zero–coupon bond. The bond was worth $10,750 at the end of
the year. What
rate of return did you earn on this investment? Round your answer to the nearest tenth of
a percent.
   A) 9.3%
   B) 1.1%
   C) 7.5%
   D) 10.8%

Answer: C

Comment: $r_1 = \dfrac{C_1}{C_0} - 1 = \dfrac{\$10,750}{\$10,000} - 1 = 7.5\%.$

Diff: 1
Topic: Rate of return

**You purchased a share of stock for $58.00. At the end of a quarter, the stock paid a dividend of $0.75, and
you sold it for $63.00 right after receiving the dividend.**

2.3.3) Refer to the information above. What was your total rate of return on this investment?
Round your answer to the nearest tenth of a percent.
   A) 7.2%
   B) 8.6%
   C) 10.9%
   D) 9.9%

Answer: D

Comment: Your total dollar return at the end of the quarter is the selling price + the dividend

payment $= \$63 + \$0.75 = \$63.75.$ Your rate of return is $r_1 = \dfrac{\$63.75}{\$58.00} - 1 = 9.9\%.$

Diff: 1
Topic: Rate of return

2.3.4) Refer to the information above. What was your dividend yield? Round your answer to the nearest tenth of a percent.
   A) 1.2%
   B) 1.3%
   C) 8.6%
   D) none of the above

Answer: B

Comment: The dividend yield is the dividend payment divided by the price paid: $\frac{\$0.75}{\$58} =$

    1.3%.

Diff: 1
Topic: Rate of return

2.3.5) Refer to the information above. What was your capital gains yield? Round your answer to the nearest tenth of a percent.
   A) 8.6%
   B) 9.9%
   C) 9.3%
   D) 9.2%

Answer: A

Comment: The capital gains yield is the percentage change in price: $\frac{\$63 - \$58}{\$58} = 8.6\%$.

Diff: 1
Topic: Rate of return

You purchased a bond for $1,000. At the end of a year, the bond paid interest of $90. You sold the bond for $950 after receiving the interest payment.

2.3.6) Refer to the information above. What was your total rate of return on this investment? Round your answer to the nearest tenth of a percent.
   A) 14.7%
   B) 9.5%
   C) 4.0%
   D) –5.0%

Answer: C

Comment: Your total dollar return at the end of the year equals the interest payment plus the selling price of the bond: $90 + $950 = $1,040. Your rate of return is $r_1 = \frac{\$1,040}{\$1,000} -$

    $1 = 4.0\%$.

Diff: 1
Topic: Rate of return

2.3.7) Refer to the information above. What was your capital gains yield? Round your answer to the nearest tenth of a percent.
   A) 5.3%
   B) 9.5%
   C) –0.1%
   D) –5.0%

Answer: D

Comment: The capital gains yield is the percentage chane in price. In this case, you had a capital loss, so your capital gains yield is negative: $\dfrac{\$950 - \$1,000}{\$1,000} = -5.0\%$.

Diff: 1
Topic: Rate of return

2.3.8) Refer to the information above. What was your coupon yield ? Round your answer to the nearest tenth of a percent.
   A) 9.5%
   B) 9.0%
   C) 9 basis points
   D) Both B and C are correct.

Answer: B

Comment: The coupon yield is the interest payment divided by the price paid for the bond:
   $90/$1,000 = 9.0%, which is 900 basis points.

Diff: 2
Topic: Rate of return

2.3.9) One hundred basis points equal
   A) $1
   B) 1%
   C) 10%
   D) 100%

Answer: B
Diff: 1
Topic: Basis points

2.3.10) The Federal Reserve announced that it would lower the discount rate from 4.75% to 4.5%. This represents a decrease of
   A) 25 basis points
   B) 250 basis points
   C) 0.25 basis points
   D) 2.5 basis points

Answer: A
Diff: 1
Topic: Basis points

2.3.11) If a bond trader indicates that the yield on a bond has increased by 50 basis points, what is the percentage change in yield?

Answer: One basis point is 1/100 of a percent, so 50 basis points is 50/100 = 0.5%. The yield on the bond has increased by 1/2 percent.

Diff: 1
Topic: Basis points

2.3.12) You purchased a stock for $60.00. At the end of one quarter, the stock paid a $0.30 dividend and was selling for $63.00. Calculate your total holding period return and indicate how much was dividend yield and how much was capital gain yield.

Answer: r_1 = dividend yield + capital gain yield = $\dfrac{\$0.30}{\$60.00}$ + $\dfrac{\$63 - \$60}{\$60}$ = 0.5% + 5% = 5.5%.

The total return for the quarter was 5.5%. 0.5% of this was dividend yield and 5% was due to capital appreciation.

Diff: 2
Topic: Rate of return

2.4 The Time Value of Money, Future Value, and Compounding

2.4.1) Your newborn daughter has received a total of $2,500 in cash from various friends and relatives. If you deposit this money for her in an investment that returns an average return of 12% a year, how much will she have accumulated on her 21st birthday, to the nearest dollar?
  A) $24,116
  B) $27,010
  C) $180,121
  D) $204,247

Answer: B

Comment: $C_{21} = C_0 \cdot (1 + r)^t = \$2,500(1.12)^{21} = \$27,010$

Diff: 1
Topic: Future value

2.4.2) You have deposited $5,000 in an account that pays 5% interest each year. How much will you have in the account at the end of six years? Round your answer to the nearest dollar.
  A) $6,700
  B) $6,500
  C) $6,381
  D) none of the above

Answer: A

Comment: $C_6 = C_0 \cdot (1 + r)^t = \$5,000(1.05)^6 = \$6,700.$

Diff: 1
Topic: Future value

2.4.3) Suppose you deposit $1,000 today in an account that pays 5% interest at the end of each year. If you make no withdrawals, what is the balance in your account at the end of four years? Round your answer to the nearest dollar.
  A) $1,050
  B) $1,200
  C) $1,216
  D) $1,020

Answer: C

Comment: $C_4 = C_0 \cdot (1 + r)^t = \$1,000(1.05)^4 = \$1,216.$

Diff: 1
Topic: Future value

2.4.4) If you had deposited $1.00 in a bank account at an annual rate of 2% at the beginning of 1929, how much would you have in the account at the end of 2008, assuming the interest rate remained constant?

    A) $81.60
    B) $160.00
    C) $4.88
    D) $47.79

Answer: C

Comment: You will have earned interest for 80 years: $FV = \$1.00(1.02)^{80} = \$4.88$

Diff: 1
Topic: Future value

2.4.5) You invested $1,000 in a mutual fund at the beginning of the year. The fund reported the following quarterly returns during the year: –5%, 5%, 4%, and 8%. How much will you have in your account at the end of the year, assuming you made no additional deposits or withdrawals? Ignore any fees and round your answer to the nearest dollar.

    A) $1,120
    B) $1,030
    C) $1,112
    D) none of the above

Answer: A

Comment: $FV = \$1,000(0.95)(1.05)(1.04)(1.08) = \$1,120$.

Diff: 2
Topic: Future value

2.4.6) If $100 is deposited into an account that earns a quoted rate of 16%, compounded quarterly, for five years, how much will be in the account at the end of the 5th year? Round your answer to the nearest dollar.

    A) $190
    B) $210
    C) $216
    D) $219

Answer: D

Comment: $C_{20} = C_0 \cdot (1 + r)^t = \$100(1 + \frac{16\%}{4})^{20} = \$219$

Diff: 2
Topic: Future value with multiple compounding periods

2.4.7) If you deposit $1,000 today in a bank account that pays 4%, compounded quarterly, how much will you have in ten years?

    A) $1,104.62
    B) $1,460.24
    C) $1,040.60
    D) $1,488.86

Answer: D

Comment: $C_1 = C_0 \cdot (1 + r)^t$. Since the 4% is compounded quarterly, the bank is paying 1% per quarter, and there are 40 quarters in ten years: $FV = \$1,000(1.01)^{40} = \$1,488.86$

Diff: 2
Topic: Future value with multiple compounding periods

2.4.8) If you deposit $20,000 today in a bank account at a quoted rate of 12%, compounded quarterly, how much will be in the account in five years if you make no withdrawals? Round your answer to the nearest dollar.
   A) $21,020
   B) $35,247
   C) $36,122
   D) none of the above

Answer: C

Comment: There are 20 quarters in five years, and the bank account is paying 12%/4 = 3% per quarter.
$$C_{20} = \$20{,}000(1.03)^{20} = \$36{,}122.$$

Diff: 2
Topic: Future value with multiple compounding periods

2.4.9) If you deposit $20,000 today in an account at a quoted rate of 16% a year, compounded semiannually, how much will you have in the account at the end of five years if you make no withdrawals?
   A) $42,007
   B) $29,386
   C) $43,822
   D) none of the above

Answer: D

Comment: There are ten six–month periods in five years, and the 6–month interest rate is 16%/2 = 8%. $C_{10} = \$20{,}000(1.08)^{10} = \$43{,}178.$

Diff: 2
Topic: Future value with multiple compounding periods

2.4.10) Suppose you deposit $1,000 today in an account that pays 5% interest at the end of each year. If you withdraw one half of the year's interest at the end of each year, what is the balance in your account after your third withdrawal? Round your answer to the nearest dollar.
   A) $1,000
   B) $1,050
   C) $1,077
   D) $1,216

Answer: C

Comment: At the end of year one, you will have earned $50 in interest. You withdraw half of that, so you will reinvest $1,025. At the end of year two, you will have $1,025(1.05) = $1,076.25. The interest earned is $1,076.25 – $1,025 = $51.25. If you withdraw half, you will reinvest $1,050.625. At the end of year three, you will have $1,050.625(1.05) = $1,103.16. The interest earned in the third year was $1,103.16 – $1,050.625 = $52.53. If you withdraw half on the interest, you will have $1,103.16 – $26.27 = $1,076.86 ≈ $1,077 left in your account.

Diff: 3
Topic: Future value

2.4.11) Suppose you deposit $1,000 today in an account that pays interest at an annual rate of 5%. What will be the balance in the account at the end of two years if you withdraw only the interest paid on the interest at that time?

   A) $1,000
   B) $1,050
   C) $1,100
   D) $1,103

Answer: C

Comment: At the end of the first year, the account will have grown to $1,000(1.05) = $1,050, $50 of this being interest. After the second year, you will have $1,000(1.05)^2 = $1,102.50. The original $1,000 will have earned $50 in interest, and the interest earned on this $50 in year 2 is $50(0.05) = $2.50. If you withdraw this, you will have $1,100 left.

Diff: 3
Topic: Future value

2.4.12) How long will it take for a $1,000 investment to grow to $3,000 if the interest rate per year is 8%, and interest is paid only at the end of each year?

   A) 12 years
   B) 13 years
   C) 14 years
   D) 15 years

Answer: D

Comment: $3,000 = $1,000(1.08)^t, so $t = \dfrac{\log 3.00}{\log 1.08} = \dfrac{0.4771}{0.0334} = 14.3$ years. Therefore, since interest is paid at the end of the year, it will take 15 years for the investment to triple.

Diff: 2
Topic: Calculating time periods

2.4.13) How long will it take to triple your investment if the interest rate per year is 9%, and interest is paid only at the end of each year?

   A) 11 years
   B) 13 years
   C) 15 years
   D) 17 years

Answer: B

Comment: $(1 + r)^t = (1 + r_t)$, so $t = \dfrac{\log (1 + r_t)}{\log (1 + r)} = \dfrac{\log 3.00}{\log 1.09} = \dfrac{0.4771}{0.0374} = 12.8$ years. Since interest is paid at the end of the year, it will take 13 years.

Diff: 2
Topic: Calculating time periods

2.4.14) Sam refuses to retire until his retirement account has a balance of at least $1 million. The account currently has a balance of $500,000, and earns a rate of 9%, compounded monthly. If Sam does not plan to make any more deposits into his account, how long will he have to wait until he retires?

   A) 7.8 years
   B) 9.4 years
   C) 12.1 years
   D) 15.2 years

Answer: A

Comment: The interest rate per month is 9%/12 = 0.75%, and Sam needs a return of $1,000,000/$500,000 – 1 = 100% on his current balance in order to have $1,000,000.

$$t = \frac{\log 2.00}{\log 1.0075} = \frac{0.3010}{0.0032} = 94.06 \text{ periods. Since each period is a month, } 94.06/12 =$$

7.8 years.

Diff: 3
Topic: Calculating time periods

2.4.15) If interest is compounded daily, then
   A) the annual percentage rate (APR) is equal to the effective annual rate (AER).
   B) the annual percentage rate (APR) is lower than the effective annual rate (AER).
   C) the annual percentage rate (APR) is greater than the effective annual rate (AER).
   D) the investor will earn less interest than if interest were compounded monthly instead.

Answer: B
Diff: 1
Topic: Compounded rates of return

2.4.16) Which of the following loan terms would result in the lowest annual cost?
   A) 4%, compounded daily
   B) 4%, compounded monthly
   C) 4%, compounded quarterly
   D) 4% compounded annually

Answer: D
Diff: 1
Topic: Compounded rates of return

2.4.17) In which of the following accounts would you prefer to invest your money?
   A) one that pays 4.5%, compounded annually
   B) one that pays 4%, compounded daily
   C) one that pays 4.75%, compounded quarterly
   D) one that pays 4.25%, compounded monthly

Answer: C

Comment: These must be compared on the basis of their effective annual rates:

   (a) $AER = (1.045)^1 - 1 = 4.5\%$
   (b) $AER = (1 + 4\%/365)^{365} - 1 = 4.08\%$
   (c) $AER = (1 + 4.75\%/4)^4 - 1 = 4.84\%$
   (d) $AER = (1 + 4.25\%/12)^{12} - 1 = 4.33\%$
   Therefore, selection "c" will offer the highest return.

Diff: 2
Topic: Compounded rates of return

2.4.18) An investment earned 12% in one year. This represents an average monthly return of
   A) 9 basis points.
   B) 95 basis points.
   C) 1 basis point.
   D) 100 basis points.

Answer: B

Comment: $1 + r_{1/12}) = \sqrt[12]{1.12} - 1 = 0.95\% = 95$ basis points.

Diff: 2
Topic: Compounded rates of return

2.4.19) A gallon of gasoline cost $0.39 during the summer of 1968 and $3.50 in the summer of
   2008. To the nearest tenth of a percent, this is an average annual increase of
   A) 7.8%.
   B) 31.9%.
   C) 3.1%.
   D) 5.6%.

Answer: D

Comment: $\$3.50 = \$0.39(1 + i)^{40}$, so i = $\sqrt[40]{\dfrac{\$3.50}{\$0.39}} - 1 = 5.6\%$.

Diff: 2
Topic: Compounded rates of return

2.4.20) A mutual fund reported the following quarterly returns: 2%, –5%, 4%, 1%. To the nearest
   tenth of a percent, this represents an annual return of
   A) 1.8%.
   B) 3.0%.
   C) 2.0%.
   D) 1.2%.

Answer: A

Comment: The total holding period return is the product of (1 + r) for each period minus 1.0:
   $(1.02)(0.95)(1.04)(1.01) - 1 = 1.8\%$.

Diff: 2
Topic: Compounded rates of return

2.4.21) The Monumental Returns Investment Company is offering you an investment that
   promises you $1,000 at the end of ten years if you invest $500 today. What average annual
   rate of return does this investment promise? Round your answer to the nearest tenth of a
   percent.
   A) 100.0%
   B) 7.2%
   C) 10.3%
   D) 20.0%

Answer: B

Comment: $\$1,000 = \$500(1 + i)^{10}$, so i = $\sqrt[10]{\dfrac{\$1,000}{\$500}} - 1 = 7.2\%$.

Diff: 2
Topic: Compounded rates of return

2.4.22) The TriValley Corporation has a 3–month loan of $30,000. At the end of three months, the firm must repay the $30,000 plus $675 in interest. What is the effective annual rate on this loan?

    A) 13.1%

    B) 30.6%

    C) 6.9%

    D) 9.3%

Answer: D

Comment: The interest rate for 3 months is $675/$30,000 = 2.25%. This is an effective annual rate of $(1.0225)^4 - 1 = 9.3\%$.

Diff: 3

Topic: Compounded rates of return

2.4.23) Margaret Bodner opened a savings account for her new–born niece with $2,000. The account pays 4% interest a year. How much will the account have in it when her niece turns 20?

Answer: FV = $2,000(1.04)^{20} \approx \$4,382$.

Diff: 1

Topic: Future value

2.4.24) Which is the better deal: a deposit of one penny today in an account that will offer a daily return of 100% for one month (i.e., the value of the account is doubled every day for 30 days) or a lump sum of $10 million to be received thirty days from today?

Answer: The future value of the penny deposit = $\$0.01(1 + 100\%)^{30} = \$0.01(2)^{30} \approx$ $10,737,418. This is greater than $10 million, so the penny deposit is the better deal.

Diff: 2

Topic: Future value

2.4.25) Three years ago, Karen deposited $25,000 in an account that paid 8% annually. Today, she transferred the funds in that account to an account that will pay her 10% annually. How much will she have in her account three years from now?

Answer: FV = $\$25,000(1.08)^3(1.10)^3 \approx \$41,917$.

Diff: 2

Topic: Future value

2.4.26) Suppose you are shopping for a loan, and three different institutions quote the same interest rate. However, the first institution uses monthly compounding, the second compounds interest quarterly, and the third uses semiannual compounding. Which loan is the best deal? Why?

Answer: The institution that compounds interest semiannually is the best deal since it is charging interest on interest fewer times. It will, therefore, offer the lowest true annual rate.

Diff: 1

Topic: Compounded rates of return

2.4.27) Consider two investment opportunities. Investment 1 pays interest at the rate of 12% per year, compounded annually while Investment 2 pays interest at the rate of 11.5% a year, compounded daily. Assuming a 365–day year, which investment provides the better return?

Answer: To compare the two, you must calculate the effective annual rates (AERs): $AER_1 =$ 12% since it is based on annual compounding. $AER_2 = (1 + 11.5\%/365)^{365} - 1 =$ 12.2%. So, Investment 2 offers the higher return.

Diff: 2
Topic: Compounded rates of return

2.4.28) When your first child is born, you open an account for him with $5,000. If this account will earn a compound average annual rate of 12%, is it possible for your child to become a millionaire in his lifetime?

Answer: $1,000,000 = \$5,000(1.12)^t$, so $t = \dfrac{\log\dfrac{\$1,000,000}{\$5,000}}{\log 1.12} = \dfrac{\log 200}{\log 1.12} = \dfrac{2.301}{0.0492} \approx 46.8$. So, yes, this account will be worth $1 million when your child is about 47 years old.

Diff: 3
Topic: Calculating time periods

2.5 Present Values, Discounting, and Capital Budgeting

2.5.1) You want to set aside some money today in order to present your son with a $3,000 trip upon his graduation from high school in seven years. If your opportunity cost of capital is 10% per year, how much do you need to set aside? Round your answer to the nearest dollar.
   A) $4,843
   B) $1,539
   C) $471
   D) $1,233

Answer: B

Comment: $PV = \dfrac{\$3,000}{(1.10)^{10}} = \$1,539.$

Diff: 1
Topic: Present value

2.5.2) How much must you deposit in an account today in order to have $1,000 in your account at the end of two years if you can earn 6.5% per year on your money? Round your answer to the nearest dollar.
   A) $939
   B) $885
   C) $882
   D) $914

Answer: C

Comment: $PV = \dfrac{\$1,000}{(1.065)^2} = \$882.$

Diff: 1
Topic: Present value

2.5.3) If the cost of capital is 8% per year, what is the discount factor for a cash flow occurring in 4 years?
   A) 1.3605
   B) 0.7350
   C) 0.9259
   D) 1.0800

Answer: B

Comment: The discount factor is $\dfrac{1}{(1.08)^4} = 0.7350$.

Diff: 1
Topic: Present value

2.5.4) How much must you deposit in a bank account today to have $1,000 at the end of 5 years if the bank quotes a rate of 5%, compounded daily? Assume a 365–day year and round your answer to the nearest dollar.
   A) $784
   B) $951
   C) $884
   D) $779

Answer: D

Comment: $PV = \dfrac{\$1,000}{(1 + 5\%/365)^{365 \cdot 5}} = \$779$.

Diff: 3
Topic: Present value

2.5.5) A zero–coupon bond promises to pay $1,000 in ten years. The appropriate annual effective interest rate for the 10–year period is a constant 6%. Rounded to the nearest dollar, the current price of the bond is
   A) $558.
   B) $747.
   C) $943.
   D) $1,000.

Answer: A

Comment: The price is equal to the present value of the promised cash flow. $PV = \dfrac{\$1,000}{(1.06)^{10}} =$
   $558.

Diff: 1
Topic: Bond price

2.5.6) A bond that promises to pay $5,000 at the end of 12 months is selling for $4,695 today. What is its implied yield? Round your answer to the nearest tenth of a percent.
    A) 9.4%
     B) 6.5%
    C) 6.1%
    D) 9.0%

Answer: B

Comment: $4,695 = \dfrac{\$5,000}{1 + r}$, so r = 6.5%.

Diff: 1
Topic: Bond price

2.5.7) You paid $713 last year for a zero–coupon bond that promised to pay you $1,000 at the end of 5 years. Rather than hold it for the remaining four years, you have decided to sell it today. The prevailing effective annual interest rate is 9%. To the nearest dollar, what price do you expect to get for your bond?
    A) $763
     B) $777
    C) $708
    D) This cannot be determined with the information provided.

Answer: C

Comment: The price that an investor will pay for the bond today is equal to the present value of the promised cash flow, based on the current opportunity cost of capital and the fact that there are now only four years remaining to maturity. PV = $\dfrac{\$1,000}{(1.09)^4} = \$708.$

Diff: 2
Topic: Bond price

2.5.8) You purchased a zero–coupon bond last week for $499. The bond promised to pay $1,000 in ten years. Since your purchase, prevailing interest rates have increased by 50 basis points. If you assume no other changes have occurred that would affect your bond's price, which of the following statements is necessarily true?
    A) The value of your investment has decreased to about $449.
     B) The value of your investment has increased to about $549.
    C) The value of your investment has decreased to about $476.
    D) The value of your investment has stayed the same since this is a zero–coupon bond.

Answer: C

Comment: An increase in interest rates will cause bond prices to decrease. Based on your purchase price, the implied average annual interest rate was 7.2%: $i = \sqrt[10]{\dfrac{\$1,000}{\$499}}$ – 1 = 7.2%. An increase of 50 basis points would mean interest rates would have increased by 0.5% to 7.7%. This would result in a bond price of approximately $\dfrac{\$1,000}{(1.077)^{10}} = \$476.$

Diff: 3
Topic: Bond price

2.5.9) How much would you have to deposit in your newborn child's account today in order to make him a millionaire at age 36 if the account will earn an average annual rate of 10%?

Answer: $PV = \dfrac{\$1,000,000}{(1.10)^{36}} \approx \$32,349.$

Diff: 1
Topic: Present value

2.5.10) A Treasury bill promises to pay $10,000 at the end of 3 months. If its annual percentage yield (APY) is 4%, what is its current market price?

Answer: If the APY is 4%, the quarterly return is $(1.04)^{1/4} = 0.985\%$. The price is equal to the present value of the cash flows, so Price $= \dfrac{\$10,000}{1.00985} \approx \$9,902.$

Diff: 3
Topic: Bond price

2.6 Net Present Value

2.6.1) Which of the following statements is *true*?
   A) It is always better to invest in a high–growth firm since it will offer a higher return on your investment dollars.
   B) Slower growing firms are the better choice for long–term investing since they are "slow but steady" whereas the high–growth firms typically have only one or two good years after which they tend to earn less than the slower–growth firms.
   C) There is no necessary connection between a firm's growth rate and the rate of return you should expect to earn by investing in the firm.
   D) Given the same expected cash flows, a firm that has a lower cost of capital will sell for a lower price than a firm that has a higher cost of capital.

Answer: C
Diff: 1
Topic: Net present value

2.6.2) A certain project will cost $50,000 and is expected to produce cash flows of $15,563 for the next seven years. The appropriate cost of capital is 15%. Calculate the project's NPV, rounding your answer to the nearest dollar.
   A) –$36,467
   B) +$58,941
   C) +$14,748
   D) +$64,748

Answer: C

Comment: $NPV = -\$50,000 + \dfrac{\$15,563}{1.15} + \dfrac{\$15,563}{(1.15)^2} + \dfrac{\$15,563}{(1.15)^3} + \ldots + \dfrac{\$15,563}{(1.15)^7} = \$14,748.$

Diff: 1
Topic: Net present value

2.6.3) A project will cost $1,000 initially, and is expected to return $500 in year 1, $400 in year 2, $300 in year 3, $100 in year 4, and nothing thereafter. What is the project's NPV if the appropriate cost of capital is 10%? Round your answer to the nearest dollar.

   A) +$79
    B) +$1,079
   C) +$182
   D) none of the above

Answer: A

Comment: $NPV = -\$1,000 + \dfrac{\$500}{1.10} + \dfrac{\$400}{(1.10)^2} + \dfrac{\$300}{(1.10)^3} + \dfrac{\$100}{(1.10)^4} = \$79.$

Diff: 1
Topic: Net present value

2.6.4) A project will cost $50,000 initially, and is expected to return $25,000 in years 1 and 2, –$20,000 in year 3, and $25,000 in years 4 and 5. Calculate the project's NPV if the appropriate cost of capital is 20%. Round your answer to the nearest dollar.

   A) –$2,247
    B) +$21,872
   C) –$1,276
   D) +$28,010

Answer: C

Comment: $NPV = -\$50,000 + \dfrac{\$25,000}{1.20} + \dfrac{\$25,000}{(1.20)^2} + \dfrac{-\$20,000}{(1.20)^3} + \dfrac{\$25,000}{(1.20)^4} + \dfrac{\$25,000}{(1.20)^5} = -\$1,276.$

Diff: 1
Topic: Net present value

2.6.5) A certain project will cost a firm $5,000 today. The project is not expected to produce any cash flows until the second year, at which point it is expected to produce $6,200. No other cash flows are anticipated. If the appropriate cost of capital is 15%, what is this project's NPV? Round your answer to the nearest dollar.

   A) –$312
    B) +$391
   C) +$5,836
   D) –$1,852

Answer: A

Comment: $NPV = -\$5,000 + \dfrac{\$6,200}{(1.15)^2} = -\$312.$

Diff: 2
Topic: Net present value

2.6.6) You have an investment opportunity that will cost $1,000 today and promises cash flows of $25 in 6 months, $25 in 12 months, $25 in 18 months, and $1,025 at the end of two years. If you could earn an APR of 6% on alternative investments, what is this investment's net present value? Round your answer to the nearest dollar.

   A) –$19

    B) –$121

    C) +$981

    D) +$18

Answer: A

Comment: An APR of 6% translates to a 6–month rate of 3%. $\text{NPV} = -\$1,000 + \dfrac{\$25}{1.03} + \dfrac{\$25}{(1.03)^2}$

$$+ \dfrac{\$25}{(1.03)^3} + \dfrac{\$1,025}{(1.03)^4} = -\$19.$$

Diff: 3
Topic: Net present value

2.6.7) An investment will cost $1,000 on January 1, 20X0 and will offer the following payouts:

Date promised	Amount
June 30, 20X0	$50
December 31, 20X0	$50
June 30, 20X1	$50
December 31, 20X1	$1,050

What is the NPV of this investment if alternative investments offer an APR of 6%? Round your answer to the nearest dollar.

   A) –$35

    B) +$30

    C) +$74

    D) –$23

Answer: C

Comment: An APR of 6% translates to a 6–month rate of 3%. $\text{NPV} = -\$1,000 + \dfrac{\$50}{1.03} + \dfrac{\$50}{(1.03)^2}$

$$+ \dfrac{\$50}{(1.03)^3} + \dfrac{\$1,050}{(1.03)^4} = \$74.$$

Diff: 3
Topic: Net present value

2.6.8) A project will cost $3,000 today and is expected to return $2,000 over the next two years. If the appropriate cost of capital is 15%, should this project be undertaken? Why?

Answer: Yes. $\text{NPV} = -\$3,000 + \dfrac{\$2,000}{1.15} + \dfrac{\$2,000}{(1.15)^2} \approx +\$251.$ This means that when all the cash

flows are converted into today's dollars, the benefits exceed the costs by about $251. Thus, the firm's value will be increased by this amount.

Diff: 1
Topic: Net present value

2.6.9) Project Hush is expected is expected to generate net cash flows of $8,200 a year for three years. If the appropriate cost of capital is 10%, what is the maximum amount the Lullaby Company should be willing to invest in this project?

Answer: Lullaby should not invest in a negative NPV project. At a 10% discount rate, the present value of the project's cash flows is $\dfrac{\$8,200}{1.10} + \dfrac{\$8,200}{(1.10)^2} + \dfrac{\$8,200}{(1.10)^3} \approx \$20,392$, so the firm should pay no more than this for the project.

Diff: 2
Topic: Net present value

2.6.10) Pepe has won a sweepstakes and can choose between two payment options: $1 million today or ten $125,000 payments, with the first payment to occur today. If Pepe can earn interest at a risk–free annual rate of 5%, which is the better deal?

Answer: The present value of the payments = $\$125,000 + \dfrac{\$125,000}{(1.05)^1} + \ldots + \dfrac{\$125,000}{(1.05)^9} \approx$

$1,013,478. Since this is greater than $1 million, Pepe should take the payments.

Diff: 3
Topic: Net present value