**CHAPTER 7**

***EQUITY MARKETS AND STOCK VALUATION***

# Answers to Concepts Review and Critical Thinking Questions

**1.** The value of any investment depends on its cash flows; i.e., what investors will actually receive. The cash flows from a share of stock are the dividends.

**2.** Investors believe the company will eventually start paying dividends (or be sold to another company).

**3.** In general, companies that need the cash will often forgo dividends since dividends are a cash expense. Young, growing companies with profitable investment opportunities are one example; another example is a company in financial distress. This question is examined in depth in a later chapter.

**4.** The general method for valuing a share of stock is to find the present value of all expected future dividends. The dividend growth model presented in the text is only valid (i) if dividends are expected to occur forever; that is, the stock provides dividends in perpetuity, and (ii) if a constant growth rate of dividends occurs forever. A violation of the first assumption might be a company that is expected to cease operations and dissolve itself some finite number of years from now. The stock of such a company would be valued by the methods of this chapter by applying the general method of valuation. A violation of the second assumption might be a start-up firm that isn’t currently paying any dividends, but is expected to eventually start making dividend payments some number of years from now. This stock would also be valued by the general dividend valuation method of this chapter.

**5.** The common stock probably has a higher price because the dividend can grow, whereas it is fixed on the preferred. However, the preferred is less risky because of the dividend and liquidation preference, so it is possible the preferred could be worth more, depending on the circumstances.

**6.** The two components are the dividend yield and the capital gains yield. For most companies, the capital gains yield is larger. This is easy to see for companies that pay no dividends. For companies that do pay dividends, the dividend yields are rarely over five percent and are often much less.

**7.** The dividend growth model makes the implicit assumption that the stock price will grow at the same constant rate as the dividend. What this means is that if the cash flows on an investment grow at a constant rate through time, the value of that investment grows at the same rate as the cash flows.

**8.** For a particular year, this can (and often does) happen. Going back to the cash flow identity, the dividend payments depend on operating cash flow, capital spending, the change in net working capital, and the cash flow to creditors. The firm could have positive operating cash flow with negative earnings, sell fixed assets, reduce net working capital, or raise cash from creditors in order to pay dividends. While this is possible in the short term, as a practical matter over the longer term, the company would probably need to have a positive net income (at least on average) in order to maintain a dividend.

**9.** It wouldn’t seem to be. Investors who don’t like the voting features of a particular class of stock are under no obligation to buy it.

**10.** Investors buy such stock because they want it, recognizing that the shares have no voting power. Presumably, investors pay a less for such shares than they would otherwise.

**11.** Presumably, the current stock value reflects the risk, timing, and magnitude of all future cash flows, both short-term *and* long-term. If this is correct, then the statement is false.

**12.** A reasonable limit for the growth rate is the growth rate of the economy, which in the U.S. has historically been about 3 to 3.5 percent (after accounting for inflation). As we will see in a later chapter, inflation has historically averaged about 3 percent, so 6 to 6.5 percent (after accounting for inflation) would be a reasonable limit.

# Solutions to Questions and Problems

*NOTE: All end-of-chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.*

*Basic*

**1.** The constant dividend growth model is:

P*t* = D*t* × (1 + *g*) / (*R* – *g*)

So, the price of the stock today is:

P0 = D0 (1 + *g*) / (*R* – *g*)

P0 = $2.35 (1.045) / (.11 – .045)

P0 = $37.78

The dividend at year 4 is the dividend today times the FVIF for the growth rate in dividends and four years, so:

P3 = D3 (1 + *g*) / (*R* – *g*)

P3 = D0 (1 + g)4 / (*R* – *g*)

P3 = $2.35 (1.045)4 / (.11 – .045)

P3 = $43.11

We can do the same thing to find the dividend in Year 16, which gives us the price in Year 15, so:

P15 = D15 (1 + *g*) / (*R* – *g*)

P15 = D0 (1 + g)16 / (*R* – *g*)

P15 = $2.35 (1.045)16 / (.11 – .045)

P15 = $73.12

There is another feature of the constant dividend growth model: The stock price grows at the dividend growth rate. So, if we know the stock price today, we can find the future value for any time in the future we want to calculate the stock price. In this problem, we want to know the stock price in three years, and we have already calculated the stock price today. The stock price in three years will be:

P3 = P0(1 + *g*)3

P3 = $37.78(1 + .045)3

P3 = $43.11

And the stock price in 15 years will be:

P15 = P0(1 + *g*)15

P15 = $37.78(1 + .045)15

P15 = $73.12

**2.** We need to find the required return of the stock. Using the constant growth model, we can solve the equation for *R*. Doing so, we find:

*R* = (D1 / P0) + *g*

*R* = ($2.45 / $48.50) + .055

*R* = .1055 or 10.55%

**3.** The dividend yield is the dividend next year divided by the current price, so the dividend yield is:

Dividend yield = D1 / P0

Dividend yield = $2.45 / $48.50

Dividend yield = .0505 or 5.05%

The capital gains yield, or percentage increase in the stock price, is the same as the dividend growth rate, so:

Capital gains yield = 5.5%

**4.** Using the constant growth model, we find the price of the stock today is:

P0 = D1 / (*R* – *g*)

P0 = $3.85 / (.12 – .0475)

P0 = $53.10

**5.** The required return of a stock is made up of two parts: The dividend yield and the capital gains yield. So, the required return of this stock is:

*R* = Dividend yield + Capital gains yield

*R* = .043 + .058

*R* = .1010 or 10.10%

**6.** We know the stock has a required return of 11 percent, and the dividend and capital gains yield are equal, so:

Dividend yield = 1/2(.11)

Dividend yield = .055 = Capital gains yield

Now we know both the dividend yield and capital gains yield. The dividend is simply the stock price times the dividend yield, so:

D1 = .055($65)

D1 = $3.58

This is the dividend next year. The question asks for the dividend this year. Using the relationship between the dividend this year and the dividend next year:

D1 = D0(1 + *g*)

We can solve for the dividend that was just paid:

$3.58 = D0(1 + .055)

D0 = $3.58 / 1.055

D0 = $3.39

**7.** The price of any financial instrument is the present value of the future cash flows. The future dividends of this stock are an annuity for eight years, so the price of the stock is the present value of an annuity, which will be:

P0 = $13.00(PVIFA9%,8)

P0 = $71.95

**8.** The price a share of preferred stock is the dividend divided by the required return. This is the same equation as the constant growth model, with a dividend growth rate of zero percent. Remember, most preferred stock pays a fixed dividend, so the growth rate is zero. This is a special case of the dividend growth model where the growth rate is zero, or the level perpetuity equation. Using this equation, we find the price per share of the preferred stock is:

*R* = D/P0

*R* = $4.50/$79.85

*R* = .0564 or 5.64%

**9.** If the company uses straight voting, you will need to own one-half of the shares, plus one share, in order to guarantee enough votes to win the election. So, the number of shares needed to guarantee election under straight voting will be:

Shares needed = (400,000 shares / 2) + 1

Shares needed = 200,001

And the total cost to you will be the shares needed times the price per share, or:

Total cost = 200,001 × $48

Total cost = $9,600,048

If the company uses cumulative voting, you will need 1/(*N* + 1) percent of the stock (plus one share) to guarantee election, where N is the number of seats up for election. So, the percentage of the company’s stock you need will be:

Percent of stock needed = 1 / (*N* + 1)

Percent of stock needed = 1 / (4 + 1)

Percent of stock needed = .20 or 20%

So, the number of shares you need to purchase is:

Number of shares to purchase = (400,000 × .20) + 1

Number of shares to purchase = 80,001

And the total cost to you will be the shares needed times the price per share, or:

Total cost = 80,001 × $48

Total cost = $3,840,048

**10.** We need to find the growth rate of dividends. Using the constant growth model, we can solve the equation for *g*. Doing so, we find:

*g* = *R* – (D1 / P0)

*g* = .12 – ($3.15 / $53)

*g* = .0606 or 6.06%

**11.** Here, we have a stock that pays no dividends for 20 years. Once the stock begins paying dividends, it will have the same dividends forever, a preferred stock. We value the stock at that point, using the preferred stock equation. It is important to remember that the price we find will be the price one year before the first dividend, so:

P19 = D20 / *R*

P19 = $20 / .07

P19 = $285.71

The price of the stock today is simply the present value of the stock price in the future. We simply discount the future stock price at the required return. The price of the stock today will be:

P0 = $285.71 / 1.0719

P0 = $79.00

**12.** Here, we need to value a stock with two different required returns. Using the constant growth model and a required return of 15 percent, the stock price today is:

P0 = D1 / (*R* – *g*)

P0 = $2.60 / (.15 – .045)

P0 = $24.76

And the stock price today with a 10 percent return will be:

P0 = D1 / (*R* – *g*)

P0 = $2.60 / (.10 – .045)

P0 = $47.27

All else held constant, a higher required return means that the stock will sell for a lower price. Also, notice that the stock price is very sensitive to the required return. In this case, the required return fell by 1/3 but the stock price almost doubled.

*Intermediate*

**13.** Here, we have a stock that pays no dividends for nine years. Once the stock begins paying dividends, it will have a constant growth rate of dividends. We can use the constant growth model at that point. It is important to remember that general constant dividend growth formula is:

P*t* = [D*t* × (1 + *g*)] / (*R* – *g*)

This means that since we will use the dividend in Year 10, we will be finding the stock price in Year 9. The dividend growth model is similar to the present value of an annuity and the present value of a perpetuity: The equation gives you the present value one period before the first payment. So, the price of the stock in Year 9 will be:

P9 = D10 / (*R* – *g*)

P9 = $12.00 / (.13 – .05)

P9 = $150.00

The price of the stock today is simply the PV of the stock price in the future. We simply discount the future stock price at the required return. The price of the stock today will be:

P0 = $150 / 1.139

P0 = $49.93

**14.** The price of a stock is the PV of the future dividends. This stock is paying four dividends, so the price of the stock is the PV of these dividends discounted at the required return. So, the price of the stock is:

P0 = $14 / 1.14 + $20 / 1.142 + $26 / 1.143 + $32 / 1.144

P0 = $64.17

**15.** With supernormal dividends, we find the price of the stock when the dividends level off at a constant growth rate, and then find the present value of the future stock price, plus the present value of all dividends during the supernormal growth period. The stock begins constant growth after the fourth dividend is paid, so we can find the price of the stock at Year 4, when the constant dividend growth begins, as:

P4 = D4 (1 + *g*) / (*R* – *g*)

P4 = $2.80(1.05) / (.11 – .05)

P4 = $49.00

The price of the stock today is the present value of the first four dividends, plus the present value of the Year 4 stock price. So, the price of the stock today will be:

P0 = $5.00 / 1.11 + $16.00 / 1.112 + $21.00 / 1.113 + $2.80 / 1.114 + $49.00 / 1.114

P0 = $66.97

**16.** With supernormal dividends, we find the price of the stock when the dividends level off at a constant growth rate, and then find the present value of the future stock price, plus the present value of all dividends during the supernormal growth period. The stock begins constant growth after the third dividend is paid, so we can find the price of the stock in Year 3, when the constant dividend growth begins as:

P3 = D3 (1 + *g*2) / (*R* – *g*2)

P3 = D0 (1 + *g*1)3 (1 + *g*2) / (*R* – *g*2)

P3 = $2.75(1.30)3(1.06) / (.13 – .06)

P3 = $91.49

The price of the stock today is the present value of the first three dividends, plus the present value of the Year 3 stock price. The price of the stock today will be:

P0 = $2.75(1.30) / 1.13 + $2.75(1.30)2 / 1.132 + $2.75(1.30)3 / 1.133 + $91.49 / 1.133

P0 = $74.40

**17.** The constant growth model can be applied even if the dividends are declining by a constant percentage, just make sure to recognize the negative growth. So, the price of the stock today will be:

P0 = D0 (1 + *g*) / (*R* – *g*)

P0 = $10.50(1 – .045) / [(.10 – (–.045)]

P0 = $69.16

**18.** We are given the stock price, the dividend growth rate, and the required return, and are asked to find the dividend. Using the constant dividend growth model, we get:

P0 = D0 (1 + *g*) / (*R* – *g*)

Solving this equation for the dividend gives us:

D0 = P0(*R* – *g*) / (1 + *g*)

D0 = $64.13(.11 – .055) / (1 + .055)

D0 = $3.34

**19.** The highest dividend yield will occur when the stock price is the lowest. So, using the 52-week low stock price, the highest dividend yield was:

Dividend yield = D/PLow

Dividend yield = $1.54/$33.42

Dividend yield = .0461 or 4.61%

The lowest dividend yield occurred when the stock price was the highest, so:

Dividend yield = D/PHigh

Dividend yield = $1.54/$55.81

Dividend yield = .02.76 or 2.76%

**20.** With supernormal dividends, we find the price of the stock when the dividends level off at a constant growth rate, and then find the present value of the future stock price, plus the present value of all dividends during the supernormal growth period. Since the first dividend with constant growth is in Year 6, we can find the price of the stock in Year 5, one year before the constant dividend growth begins as:

P5 = D6 / (*R* – *g*)

P5 = D0 (1 + *g1*)5 (1 + *g2*) / (*R* – *g*)

P5 = $2.00(1.195)5(1.05) / (.11 – .05)

P5 = $85.29

The price of the stock today is the present value of the first five dividends, plus the present value of the Year 5 stock price. The price of the stock today will be:

P0 = $2.00(1.195) / 1.11 + $2.00(1.195)2 / 1.112 + $2.00(1.195)3 / 1.113 + $2.00(1.195)4 / 1.114

+ $2.00(1.195)5 / 1.115 + $85.29 / 1.115

P0 = $63.16

According to the constant growth model, the stock seems to be overvalued. The factors that would affect the stock price are both the supernormal growth rate and the long-term growth rate, the length of the supernormal growth, and the required return.

**21.** We need to find the required return of the stock. Using the constant growth model, we can solve the equation for *R*. Doing so, we find:

*R* = (D1 / P0) + *g*

*R* = [$0.36(1 + .035) / $13.90] + .035

*R* = 0.0618 or 6.18%

The required return depends on the company and the industry. As we will see in a later, this required return appears to be low relative to historic stock returns.

**22.** We need to find the required return of the stock. Using the constant growth model, we can solve the equation for *R*. Doing so, we find:

*R* = (D1 / P0) + *g*

*R* = [$0.80(1 – .11) / $15.43] + (–.11)

*R* = –0.0639 or –6.39%

Obviously, this number is incorrect. The required return can never be negative. JC Penney investors must believe that the dividend growth rate over the past 10 years is not indicative of future growth in dividends.

For JC Penney, same-store sales had fallen during part of this period, while at the same time industry same store sales had increased. Additionally, JC Penney previously owned its own credit subsidiary that had lost money in recent years. The company also experienced increased competition from Wal-Mart, among others.

**23.** The annual dividend paid to stockholders is $0.32, and the dividend yield is 1.5 percent. Using the equation for the dividend yield:

Dividend yield = Dividend / Stock price

We can plug the numbers in and solve for the stock price:

.015 = $0.32 / P0

P0 = $0.32/.015

P0 = $21.33

The dividend yield quoted in the newspaper is rounded. This means the price calculated using the dividend will be slightly different from the actual price. The required return for Tootsie Roll shareholders using the dividend discount model is:

*R* = (D1 / P0) + *g*

*R* = [$0.32(1 + .04) / $21.33] + .04

*R* = 0.0558 or 5.58%

This number seems low, although we are really not able to determine why as of this point in the book. We will have more to say about this number in a later chapter.

**24.** We are asked to find the dividend yield and capital gains yield for each of the stocks. All of the stocks have an 18 percent required return, which is the sum of the dividend yield and the capital gains yield. To find the components of the total return, we need to find the stock price for each stock. Using this stock price and the dividend, we can calculate the dividend yield. The capital gains yield for the stock will be the total return (required return) minus the dividend yield.

W: P0 = D0(1 + *g*) / (*R* – *g*)

P0 = $2.80(1.10)/(.18 – .10)

P0 = $38.50

Dividend yield = D1/P0

Dividend yield = $2.80(1.10)/$38.50

Dividend yield = .08 or 8%

Capital gains yield = Total return – Dividend yield

Capital gains yield = .18 – .08

Capital gains yield = .10 or 10%

X: P0 = D0(1 + *g*) / (*R* – *g*)

P0 = $2.80/(.18 – .00)

P0 = $15.56

Dividend yield = D1/P0

Dividend yield = $2.80/$15.56

Dividend yield = .18 or 18%

Capital gains yield = Total return – Dividend yield

Capital gains yield = .18 – .18

Capital gains yield = .00 or 0%

Y: P0 = D0(1 + *g*) / (*R* – *g*)

P0 = $2.80(1 – .05)/[.18 – (–.05)]

P0 = $11.57

Dividend yield = D1/P0

Dividend yield = $2.80(1 – .05)/$11.57

Dividend yield = .23 or 23%

Capital gains yield = Total return – Dividend yield

Capital gains yield = .18 – .23

Capital gains yield = –.05 or –5%

Z: To find the price of Stock Z, we find the price of the stock when the dividends level off at a constant growth rate, and then find the present value of the future stock price, plus the present value of all dividends during the supernormal growth period. The stock begins constant growth in Year 3, so we can find the price of the stock in Year 2, one year before the constant dividend growth begins as:

P2 = D2 (1 + *g*2) / (*R* – *g*2)

P2 = D0 (1 + *g1*)2 (1 + *g2*) / (*R* – *g*2)

P2 = $2.80(1.20)2(1.12) / (.18 – .12)

P2 = $75.26

The price of the stock today is the present value of the first three dividends, plus the present value of the Year 3 stock price. The price of the stock today will be:

P0 = $2.80(1.20) / 1.18 + $2.80(1.20)2 / 1.182 + $75.26 / 1.182

P0 = $59.80

Dividend yield = D1/P0

Dividend yield = $2.80(1.20)/$59.80

Dividend yield = .056 or 5.6%

Capital gains yield = Total return – Dividend yield

Capital gains yield = .18 – .056

Capital gains yield = .124 or 12.4%

In all cases, the required return is 18 percent, but the return is distributed differently between current income and capital gains. High-growth stocks have an appreciable capital gains component but a relatively small current income yield; conversely, mature, negative-growth stocks provide a high current income but also price depreciation over time.

**25.** *a*. Using the constant growth model, the price of the stock paying annual dividends will be:

P0 = D0(1 + *g*) / (*R* – *g*) = $2.80(1.06)/(.12 – .06) = $49.47

*b*. If the company pays quarterly dividends instead of annual dividends, the quarterly dividend will be one-fourth of annual dividend, or:

Quarterly dividend: $2.80(1.06)/4 = $0.7420

To find the equivalent annual dividend, we must assume that the quarterly dividends are reinvested at the required return. We can then use this interest rate to find the equivalent annual dividend. In other words, when we receive the quarterly dividend, we reinvest it at the required return on the stock. So, the effective quarterly rate is:

Effective quarterly rate: 1.12.25 – 1 = .0287

The effective annual dividend will be the FVA of the quarterly dividend payments at the effective quarterly required return. In this case, the effective annual dividend will be:

Effective D1 = $0.7420(FVIFA2.87%,4) = $3.10

Now, we can use the constant growth model to find the current stock price as:

P0 = $3.10/(.12 – .06) = $51.64

Note that we cannot simply find the quarterly effective required return and growth rate to find the value of the stock. This would assume the dividends increased each quarter, not each year. Assuming you can reinvest the dividends at the required return of the stock, this model would be appropriate.