



Part II

Stock Valuation

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Key Concepts and Skills

- Understand how stock prices depend on future dividends and dividend growth
- Be able to compute stock prices using the dividend growth model
- Understand how corporate directors are elected
- Understand how stock markets work
- Understand how stock prices are quoted

Chapter Outline

- o Common Stock Valuation
- o Some Features of Common and Preferred Stocks
- o The Stock Markets

Cash Flows for Stockholders

- If you buy a share of stock, you can receive cash in two ways:
 - The company pays dividends
 - You sell your shares, either to another investor in the market or back to the company
- As with bonds, the price of the stock is the present value of these expected cash flows

One-Period Example

- o Suppose you are thinking of purchasing the stock of Moore Oil, Inc.
 - o You expect it to pay a \$2 dividend in one year, and you believe that you can sell the stock for \$14 at that time.
 - o If you require a return of 20% on investments of this risk, what is the maximum you would be willing to pay?
 - Compute the PV of the expected cash flows
 - $\text{Price} = (14 + 2) / (1.2) = \13.33
 - Or $\text{FV} = 16$; $\text{I/Y} = 20$; $\text{N} = 1$; $\text{CPT PV} = -13.33$

Two-Period Example

- Now, what if you decide to hold the stock for two years?
 - In addition to the dividend in one year, you expect a dividend of \$2.10 in two years and a stock price of \$14.70 at the end of year 2.
 - Now how much would you be willing to pay?
 - $PV = 2 / (1.2) + (2.10 + 14.70) / (1.2)^2 = 13.33$

Three-Period Example

- o Finally, what if you decide to hold the stock for three years?
 - o In addition to the dividends at the end of years 1 and 2, you expect to receive a dividend of \$2.205 at the end of year 3 and the stock price is expected to be \$15.435.
 - o Now how much would you be willing to pay?
 - $PV = 2 / 1.2 + 2.10 / (1.2)^2 + (2.205 + 15.435) / (1.2)^3 = 13.33$

Developing The Model

- o You could continue to push back the year in which you will sell the stock
- o You would find that the price of the stock is really just the *present value of all expected future dividends*
- o So, how can we estimate all future dividend payments?

Estimating Dividends: Special Cases

o Constant dividend

- The firm will pay a constant dividend forever
- This is like preferred stock
- The price is computed using the perpetuity formula

o Constant dividend growth

- The firm will increase the dividend by a constant *percent* every period
- The price is computed using the growing perpetuity model

o Supernormal growth

- Dividend growth is not consistent initially, but settles down to constant growth eventually
- The price is computed using a multistage model

Zero Growth

- If constant dividends are expected at regular intervals forever, then this is a perpetuity and the present value of expected future dividends can be found using the perpetuity formula

- $P_0 = D / R$

- Suppose stock is expected to pay a \$0.50 dividend every quarter and the required return is 10% with quarterly compounding. What is the price?

- $P_0 = .50 / (.1 / 4) = \$20$

Dividend Growth Model

○ Dividends are expected to grow at a constant rate per period.

- $P_0 = D_1 / (1+R) + D_2 / (1+R)^2 + D_3 / (1+R)^3 + \dots$
- $P_0 = D_0(1+g)/(1+R) + D_0(1+g)^2/(1+R)^2 + D_0(1+g)^3/(1+R)^3 + \dots$

○ With a little algebra and some series work, this reduces to:

$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{D_1}{R-g}$$

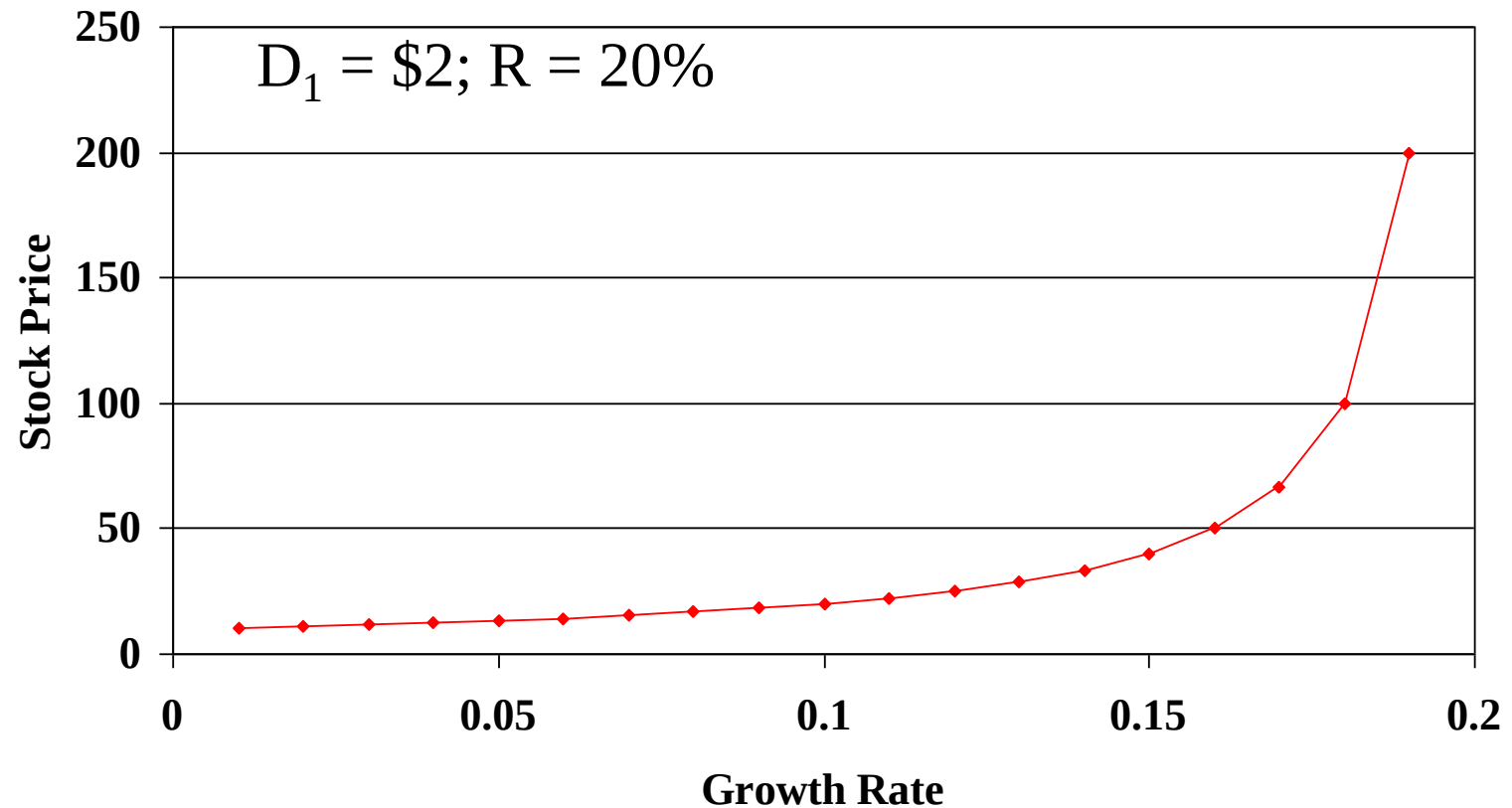
DGM – Example 1

- o Suppose Big D, Inc., just paid a dividend of \$0.50 per share.
- o It is expected to increase its dividend by 2% per year.
- o If the market requires a return of 15% on assets of this risk, how much should the stock be selling for?
- o $P_0 = .50(1+.02) / (.15 - .02) = \3.92

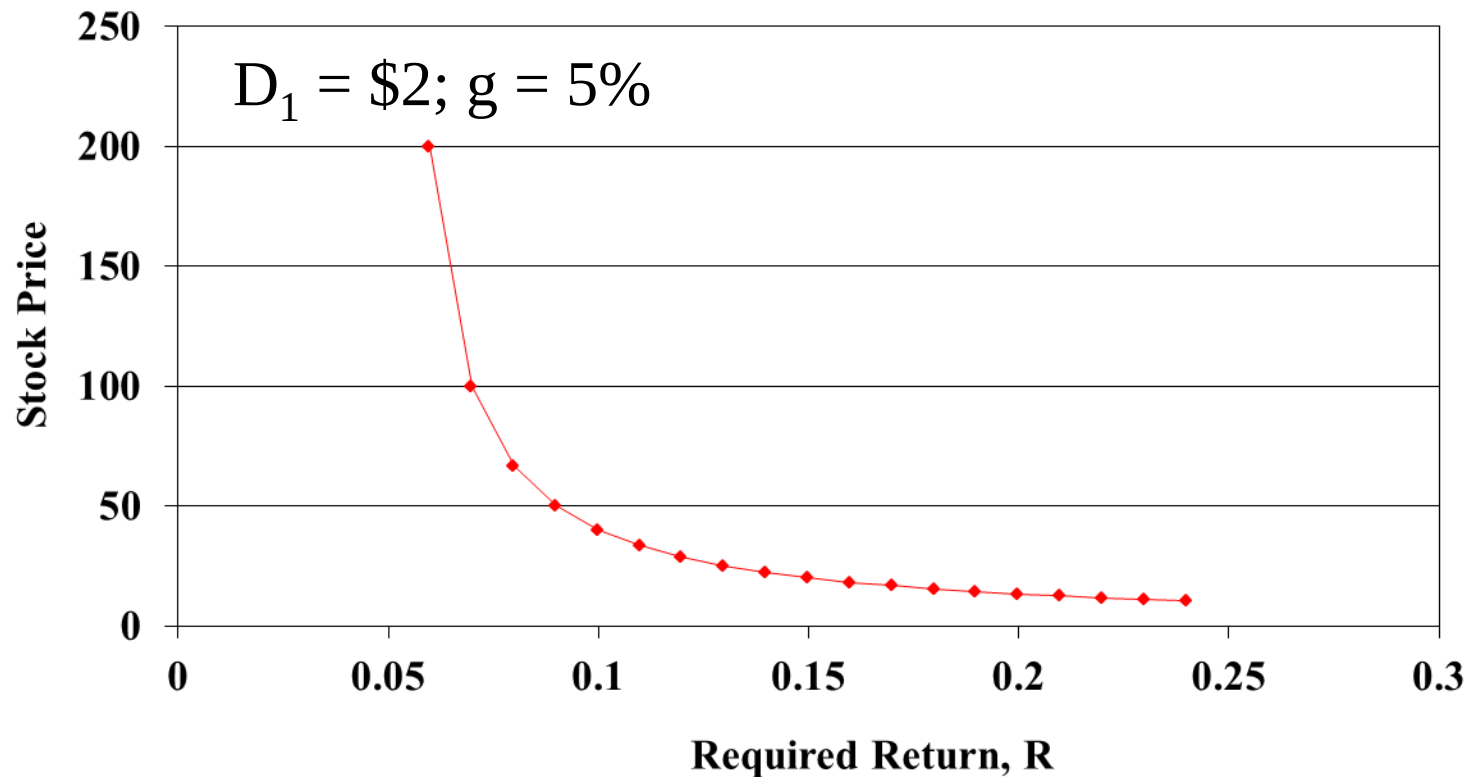
DGM – Example 2

- o Suppose TB Pirates, Inc., is expected to pay a \$2 dividend in one year.
- o If the dividend is expected to grow at 5% per year and the required return is 20%, what is the price?
 - $P_0 = 2 / (.2 - .05) = \$13.33$
 - Why isn't the \$2 in the numerator multiplied by (1.05) in this example?

Stock Price Sensitivity to Dividend Growth, g



Stock Price Sensitivity to Required Return, R



Example 8.3 Gordon Growth Company - I

- Gordon Growth Company is expected to pay a dividend of \$4 next period, and dividends are expected to grow at 6% per year. The required return is 16%.
- What is the current price?
 - $P_0 = 4 / (.16 - .06) = \40
 - Remember that we already have the dividend expected next year, so we don't multiply the dividend by $1+g$

Example 8.3 – Gordon Growth Company - II

- o What is the price expected to be in year 4?
 - $P_4 = D_4(1 + g) / (R - g) = D_5 / (R - g)$
 - $P_4 = 4(1+.06)^4 / (.16 - .06) = 50.50$
- o What is the implied return given the change in price during the four year period?
 - $50.50 = 40(1+\text{return})^4$; return = 6%
 - PV = -40; FV = 50.50; N = 4; CPT I/Y = 6%
- o The price is assumed to grow at the same rate as the dividends

Non-constant Growth

Example - I

- Suppose a firm is expected to increase dividends by 20% in one year and by 15% in two years.
- After that, dividends will increase at a rate of 5% per year indefinitely.
- If the last dividend was \$1 and the required return is 20%, what is the price of the stock?
- Remember that we have to find the PV of all expected future dividends.

Nonconstant Growth

Example - II

- o Compute the dividends until growth levels off
 - $D_1 = 1(1.2) = \$1.20$
 - $D_2 = 1.20(1.15) = \$1.38$
 - $D_3 = 1.38(1.05) = \$1.449$
- o Find the expected future price
 - $P_2 = D_3 / (R - g) = 1.449 / (.2 - .05) = 9.66$
- o Find the present value of the expected future cash flows
 - $P_0 = 1.20 / (1.2) + (1.38 + 9.66) / (1.2)^2 = 8.67$

Quick Quiz – Part I

- What is the value of a stock that is expected to pay a constant dividend of \$2 per year if the required return is 15%?
- What if the company starts increasing dividends by 3% per year, beginning with the next dividend? The required return stays at 15%.

Using the DGM to Find R

Start with the DGM:

$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{D_1}{R-g}$$

$$R = \frac{D_0(1+g)}{P_0} + g = \frac{D_1}{P_0} + g$$

Example: Finding the Required Return

- o Suppose a firm's stock is selling for \$10.50. It just paid a \$1 dividend, and dividends are expected to grow at 5% per year. What is the required return?
- o What is the dividend yield?
- o What is the capital gains yield?

Stock Valuation Using Multiples

- Another common valuation approach is to multiply a benchmark PE ratio by earnings per share (EPS) to come up with a stock price
- $P_t = \text{Benchmark PE ratio} * EPS_t$
- The benchmark PE ratio is often an industry average or based on a company's own historical values
- The price-sales ratio can also be used

Example: Stock Valuation Using Multiples

- o Suppose a company had earnings per share of \$3 over the past year. The industry average PE ratio is 12.
- o Use this information to value this company's stock price.

Table 8.1 - Stock Valuation Summary

I. The General Case

In general, the price today of a share of stock, P_0 , is the present value of all of its future dividends, $D_1, D_2, D_3, \dots$:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \dots$$

where R is the required return.

II. Constant Growth Case

If the dividend grows at a steady rate, g , then the price can be written as:

$$P_0 = \frac{D_1}{R - g}$$

This result is called the *dividend growth model*.

III. Nonconstant Growth

If the dividend grows steadily after t periods, then the price can be written as:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \dots + \frac{D_t}{(1+R)^t} + \frac{P_t}{(1+R)^t}$$

where

$$P_t = \frac{D_t \times (1+g)}{(R-g)}$$

IV. Two-Stage Growth

If the dividend grows at rate g_1 for t periods and then grows at rate g_2 thereafter, then the price can be written as:

$$P_0 = \frac{D_1}{R - g_1} \times \left[1 - \left(\frac{1+g_1}{1+R} \right)^t \right] + \frac{P_t}{(1+R)^t}$$

where

$$P_t = \frac{D_{t+1}}{R - g_2} = \frac{D_0 \times (1+g_1)^t \times (1+g_2)}{R - g_2}$$

V. Valuation Using Multiples

For stocks that don't pay dividends (or have erratic dividend growth rates), we can value them using the PE ratio and/or the price-sales ratio:

$$P_t = \text{Benchmark PE ratio} \times \text{EPS}_t$$

$$P_t = \text{Benchmark price-sales ratio} \times \text{Sales per share}_t$$

VI. The Required Return

The required return, R , can be written as the sum of two things:

$$R = D_1/P_0 + g$$

where D_1/P_0 is the *dividend yield* and g is the *capital gains yield* (which is the same thing as the growth rate in dividends for the steady growth case).

Features of Common Stock

- o Voting Rights
- o Proxy voting
- o Classes of stock
- o Other Rights
 - Share proportionally in declared dividends
 - Share proportionally in remaining assets during liquidation
 - Preemptive right – first shot at new stock issue to maintain proportional ownership if desired

Dividend Characteristics

- Dividends are not a liability of the firm until a dividend has been declared by the Board
- Consequently, a firm cannot go bankrupt for not declaring dividends
- Dividends and Taxes
 - Dividend payments are not considered a business expense; therefore, they are not tax deductible
 - The taxation of dividends received by individuals depends on the holding period
 - Dividends received by corporations have a minimum 70% exclusion from taxable income

Features of Preferred Stock

◌ Dividends

- Stated dividend that must be paid before dividends can be paid to common stockholders
- Dividends are not a liability of the firm, and preferred dividends can be deferred indefinitely
- Most preferred dividends are cumulative – any missed preferred dividends have to be paid before common dividends can be paid

◌ Preferred stock generally does not carry voting rights

Quick Quiz – Part II

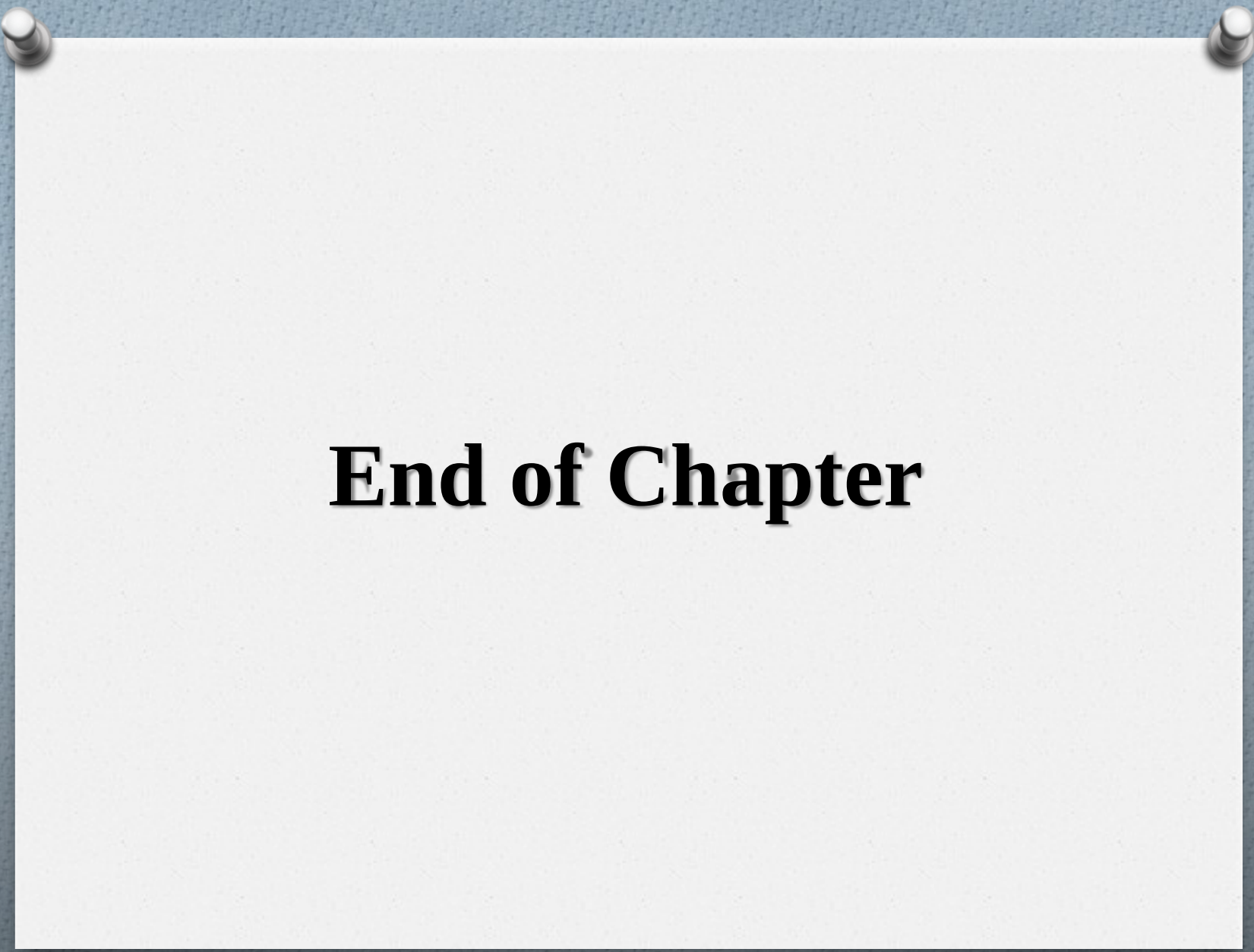
- o You observe a stock price of \$18.75. You expect a dividend growth rate of 5%, and the most recent dividend was \$1.50. What is the required return?
- o What are some of the major characteristics of common stock?
- o What are some of the major characteristics of preferred stock?

Ethics Issues

- o The status of pension funding (i.e., over- vs. under-funded) depends heavily on the choice of a discount rate. When actuaries are choosing the appropriate rate, should they give greater priority to future pension recipients, management, or shareholders?
- o How has the increasing availability and use of the internet impacted the ability of stock traders to act unethically?

Comprehensive Problem

- o XYZ stock currently sells for \$50 per share. The next expected annual dividend is \$2, and the growth rate is 6%. What is the expected rate of return on this stock?
- o If the required rate of return on this stock were 12%, what would the stock price be, and what would the dividend yield be?



End of Chapter