PROBLEM SET: Stock Pricing

**Exercise 1.**

You buy a stock that has just paid out a dividend of $5. The dividend is expected to grow at an 5% annual rate for the next three years, then it will grow 4% in perpetuity. The risk-adjusted discount rate is 10%.

How much must you pay for the stock?

1. $82.2
2. $86.2
3. $89.1
4. $114.0
5. I choose not to answer.

**Exercise 2.** [2]

Consider a share which is currently trading at 20. The share has a required return of 15 percent and a dividend growth rate of 2.5 percent.

What was the last dividend payment?

1. 2.44
2. 2.50
3. 2.93
4. 3.00
5. I choose not to answer.

**Exercise 3.** *Stock* [3]

A stock is expected to pay dividends of 50 next period. After that dividends are expected to grow at 5% forever. Your opportunity cost of capital is 10%.

1. What is todays price?
2. What is the price in year 5?

**Exercise 4.** *XYZ*

Suppose that a shareholder has just paid $50 per share for XYZ company stock. The stock will pay a dividend of $2 per share in the upcoming year. The dividend is expected to grow at an annual rate of 10% for the indefinite future. The shareholder felt that the price she paid was an appropriate price, given her assessment of XYZ's risks.

1. What is the annual required rate of return for this shareholder?

**Exercise 5.**

The Handy Dandy Hardware Store chain is expected to benefit greatly from the recent interest in 'do-it-yourself' home repair. Analysts are forecasting that Handy Dandy will experience two years of abnormally high growth of 20% in earnings and dividends before settling down to a normal growth rate of 5% in year 3 and beyond. Last year's dividend per share was $4.00. Assume that the appropriate opportunity cost of capital is 19%.

1. Determine the market price of Handy Dandy's common stock.

**Exercise 6.** *Parnelli Products* [4]

Parnelli Products stock is currently selling for $45 per share. The firm is earning $5 per share and is expected to pay a year-end dividend of $1.80. Disregard taxes.

1. If investors require a 12% return, what rate of growth must be expected for Parnelli?

**Exercise 7.** *Solid Air plc* [2]

Solid Air plc pays a constant dividend of 10 euro on its equity. The company will maintain this dividend for the next six years, and will then cease paying dividends for ever. If the required return on the company's equity is 10%, what is the current share price?

**Exercise 8.** *MII* [2]

Mortgage Instruments Inc is expected to pay dividends of €1.03 next year. The company just paid dividends of €1. The growth rate is expected to continue. The appropriate discount rate is 5%.

1. How much should be paid for Mortgage Instruments stock just after the dividend?

**Empirical**
**Solutions**
PROBLEM SET: Stock Pricing

**Exercise 1.**
**Exercise 2.** [2]

$$P = 20 = \frac{D_0(1+0.025)}{0.15-0.025}$$
$$D_0 = \frac{20(0.15-0.025)}{1.025} = 2.44$$

The last dividend was 2.44.
(a) is correct
**Exercise 3.** *Stock* [3]

1.
$$S_0 = \frac{E[D_1]}{r-g} = \frac{50}{0.10-0.05} = 1000$$

2.
$$E[D_6] = E[D_1] \cdot (1.05)^6 = 67$$
$$S_5 = \frac{E[D_6]}{r-g} = \frac{67}{0.10-0.05} = 1340$$

**Exercise 4.** *XYZ*

$$P_0 = \frac{D_1}{r-g}$$
$$50 = \frac{2}{r-0.1}$$
$$r - 0.1 = \frac{2}{50}$$
$$r = 14\%.$$

**Exercise 5.**

$$P_0 = \sum_{t=1}^{\infty} \frac{E[D_t]}{(1+r)^t}$$
$$P_0 = \frac{E[D_1]}{(1+r)} + \frac{E[D_2]+E[P_2]}{(1+r)^2}$$

We need estimates of $E[D_1], E[D_2]$ and $E[P_2]$.

$$\begin{aligned} E[D_1] &= 4.00 \cdot 1.20 = 4.80 \\ E[D_2] &= 4.00 \cdot 1.20^2 = 5.76 \\ E[P_2] &= \frac{E[D_3]}{r-g} = \frac{5.76 \cdot 1.05}{0.19-0.05} = 43.20 \\ P_0 &= \frac{4.80}{1.19} + \frac{5.76+43.20}{(1.19)^2} = 38.60 \end{aligned}$$

**Exercise 6.** *Parnelli Products* [4]

$$E[D_1] = 1.80$$

$$P_0 = 45$$

$$P_0 = \frac{E[D_1]}{r - g}$$

$$r - g = \frac{E[D_1]}{P_0} = \frac{1.8}{45} = 4\%$$

$$r - g = 4\% \quad \rightarrow \quad g = r - 4\%$$

$$g = 0.12 - 0.04 = 8\%$$

**Exercise 7.** *Solid Air plc* [2]

| $t$ | $C_t$ |
|---|---|
| 0 | 0 |
| 1 | 10 |
| 2 | 10 |
| 3 | 10 |
| 4 | 10 |
| 5 | 10 |
| 6 | 10 |

$$NPV = 0 + \frac{10}{(1+0.1)^1} + \frac{10}{(1+0.1)^2} + \frac{10}{(1+0.1)^3} + \frac{10}{(1+0.1)^4} + \frac{10}{(1+0.1)^5} + \frac{10}{(1+0.1)^6} = 43.5526$$

**Exercise 8.** *MII* [2]

$$P = \frac{1.03}{0.05 - 0.03} = 51.50$$

€51.50