Solutions to Problems: Chapter 7

P7-1. Authorized and available shares

LG 2; Basic

a. Maximum shares available for sale

Authorized shares	2,000,000
Less: Shares outstanding	1,400,000
Available shares	600,000

b. $$\text{Total shares needed} = \frac{\$48{,}000{,}000}{\$60} = 800{,}000 \text{ shares}$$

The firm requires an additional 200,000 authorized shares to raise the necessary funds at $60 per share.

c. Aspin must amend its corporate charter to authorize the issuance of additional shares.

P7-2. Preferred dividends

LG 2; Intermediate

a. $8.80 per year or $2.20 per quarter.

b. $2.20. For a noncumulative preferred only the latest dividend has to be paid before dividends can be paid on common stock.

c. $8.80. For cumulative preferred all dividends in arrears must be paid before dividends can be paid on common stock. In this case the board must pay the three dividends missed plus the current dividend.

P7-3. Preferred dividends

LG 2; Intermediate

A	$15.00	quarters in arrears plus the latest quarter
B	$8.80	only the latest quarter
C	$11.00	only the latest quarter
D	$25.50	quarters in arrears plus the latest quarter
E	$8.10	only the latest quarter

P7-4. Convertible preferred stock

LG 2; Challenge

a. Conversion value = conversion ratio × stock price = 5 × $20 = $100

b. Based on comparison of the preferred stock price versus the conversion value, the investor should convert. If converted, the investor has $100 of value versus only $96 if she keeps ownership of the preferred stock.

c. If the investor converts to common stock she will begin receiving $1.00 per share per year of dividends. Conversion will generate $5.00 per year of total dividends. If the investor keeps the preferred they will receive $10.00 per year of dividends. This additional $5.00 per year
in dividends may cause the investor to keep the preferred until forced to convert through use of the call feature. Furthermore, while common stock dividends may be cut or eliminated altogether with no protection, preferred dividends are typically fixed and cumulative provision.

P7-5. Personal finance: Common stock valuation–zero growth: $P_0 = D_1 \div r_s$

LG 4; Basic

a. $P_0 = \$2.40 \div 0.12 = \$20$

b. $P_0 = \$2.40 \div 0.20 = \$12$

c. As perceived risk increases, the required rate of return also increases, causing the stock price to fall.

P7-6. Personal finance: common stock valuation—zero growth

LG 4; Intermediate

$$\text{Value of stock when purchased} = \frac{\$5.00}{0.16} = \$31.25$$

$$\text{Value of stock when sold} = \frac{\$5.00}{0.12} = \$41.67$$

Sally's capital gain is $10.42 ($41.67 – $31.25) per share.

Sally's total capital gain is $100 \times \$1{,}042.00$.

P7-7. Preferred stock valuation: $PS_0 = D_p \div r_p$

LG 4; Intermediate

a. $PS_0 = \$6.40 \div 0.093$

$PS_0 = \$68.82$

b. $PS_0 = \$6.40 \div 0.105$

$PS_0 = \$60.95$

The investor would lose $7.87 per share ($68.82 – $60.95) because as the required rate of return on preferred stock issues increases above the 9.3% return she receives, the value of her stock declines.

P7-8. Common stock value—constant growth: $P_0 = D_1 \div (r_s - g)$

LG 4; Basic

Firm	$\boldsymbol{P_0 = D_1 \div (r_s - g)}$		**Share Price**
A	$P_0 = \$1.20 \div (0.13 - 0.08)$	=	$ 24.00
B	$P_0 = \$4.00 \div (0.15 - 0.05)$	=	$ 40.00
C	$P_0 = \$0.65 \div (0.14 - 0.10)$	=	$ 16.25
D	$P_0 = \$6.00 \div (0.09 - 0.08)$	=	$600.00
E	$P_0 = \$2.25 \div (0.20 - 0.08)$	=	$ 18.75

P7-9. Common stock value—constant growth

LG 4; Intermediate

a. $r_s = \frac{D_1}{P_0} + g$

$r_s = \frac{\$1.20 \times (1.05)}{\$28} + 0.05$

$r_s = \frac{\$1.26}{\$28} + 0.05 = 0.045 + 0.05 = 0.095 = 9.5\%$

b. $r_s = \frac{\$1.20 \times (1.10)}{\$28} + 0.10$

$r_s = \frac{\$1.32}{\$28} + 0.10 = 0.047 + 0.10 = 0.147 = 14.7\%$

P7-10. Personal finance: Common stock value—constant growth: $P_0 = D_1 \div (r_s - g)$

LG 4; Intermediate

Computation of growth rate:

N = 5, PV = –$2.25, FV = $2.87

Solve for I = 5%

a. Value at 13% required rate of return:

$P_0 = \frac{\$3.02}{0.13 - 0.05} = \$37.75$

b. Value at 10% required rate of return:

$P_0 = \frac{\$3.02}{0.10 - 0.05} = \$60.40$

c. As risk increases, the required rate of return increases, causing the share price to fall.

P7-11. Common stock value—variable growth:

LG 4; Challenge

P_0 = *PV* of dividends during initial growth period

+ *PV* of price of stock at end of growth period.

Steps 1 and 2: Value of cash dividends and *PV* of annual dividends

t	D_0	1.25^t	D_t	$1/(1.15)^t$	*PV* of Dividends
1	$2.55	1.2500	$3.19	0.8696	$2.77
2	2.55	1.5625	3.98	0.7561	3.01
3	2.55	1.9531	4.98	0.6575	3.27
					$9.05

Step 3: *PV* of price of stock at end of initial growth period

$D_{3+1} = \$4.98 \times (1 + 0.10)$

$D_4 = \$5.48$

$P_3 = [D_4 \div (r_s - g_2)]$

$P_3 = \$5.48 \div (0.15 - 0.10)$

$P_3 = \$109.56$

PV of stock at end of year 3

N = 3, I = 15%, FV = $109.60

PV = $72.04

Step 4: Sum of *PV* of dividends during initial growth period and *PV* price of stock at end of growth period

$P_0 = \$9.05 + \$72.04$

$P_0 = \$81.09$

P7-13. Common stock value—variable growth

LG 4; Challenge

a.

t	D_0	1.08^t	D_t	$1/(1.11)^t$	*PV* of Dividends
1	$1.80	1.0800	$1.94	0.9009	$1.75
2	1.80	1.1664	2.10	0.8116	1.70
3	1.80	1.2597	2.27	0.7312	1.66
					$5.11

$D_4 = D_3(1.05) = \$2.27 \times (1.05) = \$2.38$

$P_3 = [D_4 \div (r_s - g)]$

$P_3 = \$2.38 \div (0.11 - 0.05)$

$P_3 = \$39.67$

PV of stock at end of year 3

N = 3, I = 11%, FV = $39.67

Solve for PV = $29.01

PV of dividends and future stock price

$5.11 + $29.01 = $34.12

b. The *PV* of the first 3 year's dividends is the same as in part a.

$D_4 = D_3(1.0) = 2.27$

$P_3 = [D_4 \div (r_s - g)]$

$P_3 = \$2.27 \div 0.11$

$P_3 = \$20.64$

PV of stock at end of year 3

N = 3, I =11%, FV $20.64

Solve for PV = $15.09

$P_0 = \$5.11 + \$15.09 = \$20.20$

c. The *PV* of the first 3 year's dividends is the same as in part a.

$D_4 = D_3(1.10) = 2.50$

$P_3 = [D_4 \div (r_s - g)]$

$P_3 = \$2.50 \div (0.11 - 0.10)$

$P_3 = \$250.00$

PV of stock at end of year 3

N = 3, I =11%, FV = $250.00

PV = $182.80

$P_0 = \$5.11 + \$182.80 = \$187.91$

P7-14. Personal finance: Common stock value—all growth models

LG 4; Challenge

a. $P_0 = (CF_0 \div r)$

$P_0 = \$42,500 \div 0.18$

$P_0 = \$236,111$

b. $P_0 = (CF_1 \div (r - g))$

$P_0 = (\$45,475^* \div (0.18 - 0.07)$

$P_0 = \$413,409.09$

$^*CF_1 = \$42,500(1.07) = \$45,475$

c. Steps 1 and 2: Value of cash dividends and *PV* of annual dividends

t	D_0	1.12^t	D_t	$1/(1.18)^t$	*PV* of Dividends
1	$42,500	1.1200	$47,600	0.8475	$40,338.98
2	42,500	1.2544	53,312	0.7182	38,287.85
					$78,626.83

Step 3: *PV* of price of stock at end of initial growth period

$D_{2+1} = \$53,312 \times (1 + 0.07)$

$D_3 = \$57,043.84$

$P_2 = [D_3 \div (r_s - g)]$

$P_2 = \$57,043.84 \div (0.18 - 0.07)$

$P_2 = \$518,580.36$

PV of stock at end of year 2

N = 2, I = 18%, FV = $518,580.36

Solve for PV = $372,436.34

Step 4: Sum of *PV* of dividends during initial growth period and *PV* price of stock at end of growth period

$P_0 = \$78,626.83 + \$372,436.34$

$P_0 = \$451,063.17$

P7-16. Personal finance: Using the free cash flow valuation model to price an IPO

LG 5; Challenge

a. The value of the firm's common stock is accomplished in four steps.

(1) Calculate the *PV* of FCF from 2017 to infinity.

[$1,100,000 (1.02)] ÷ (0.08 – 0.02) = $1,122,000 ÷ 0.06 = $18,700,000

(2) Add the *PV* of the cash flow obtained in (1) to the cash flow for 2016.

FCF_{2016} = \$18,700,000 + 1,100,000 = \$19,800,000

(3) Find the *PV* of the cash flows for 2010 through 2016.

Year	FCF	$1/(1.08)^t$	*PV*
2013	\$700,000	0.9259	\$ 648,060
2014	800,000	0.8573	685,840
2015	950,000	0.7938	754,110
2016	19,800,000	0.7350	14,533,000
	Value of entire company, V_c =		\$16,641,010

(4) Calculate the value of the common stock using Equation 7.8.

$V_S = V_C - V_D - V_P$

V_S = \$16,641,010 – \$2,700,000 – \$1,000,000 = \$12,941,010

Value per share = \$12,941,010 ÷ 1,100,000 shares = \$10.76

b. Based on this analysis the IPO price of the stock is over valued by \$0.74 (\$12.50 – \$11.76) and you should not buy the stock.

c. The revised value of the firm's common stock is calculated in four steps.

(1) Calculate the *PV* of FCF from 2017 to infinity.

[\$1,100,000 (1.03)] ÷ (0.08 – 0.03) = \$1,133,000 ÷ 0.05 = \$22,660,000

(2) Add the *PV* of the cash flow obtained in (1) to the cash flow for 2016.

FCF_{2016} = \$22,660,000 + 1,100,000 = \$23,760,000

(3) Find the *PV* of the cash flows for 2010 through 2016.

Year	FCF	$1/(1.08)^t$	*PV*
2013	\$700,000	0.9259	\$ 648,060
2014	800,000	0.8573	685,840
2015	950,000	0.7938	754,110
2016	23,760,000	0.7350	17,463,600
	Value of entire company, V_c =		\$19,551,610

(4) Calculate the value of the common stock using Equation 7.8.

$V_S = V_C - V_D - V_P$

V_S = \$19,551,610 – \$2,700,000 – \$1,000,000 = \$15,851,610

Value per share = \$15,851,610 ÷ 1,100,000 shares = \$14.41

If the growth rate is changed to 3% the IPO price of the stock is under valued by \$1.91 (\$14.41 – \$12.50) and you should buy the stock.

P7-17. Book and liquidation value

LG 5; Intermediate

a. Book value per share:

$$\frac{\text{Book value of assets} - (\text{liabilities} + \text{preferred stock at book value})}{\text{number of shares outstanding}}$$

$$\text{Book value per share} = \frac{\$780{,}000 - \$420{,}000}{10{,}000} = \$36 \text{ per share}$$

b. Liquidation value:

Cash	$40,000	Liquidation Value of Assets	722,000
Marketable Securities	60,000	Less: Current Liabilities	(160,000)
Accounts Rec. (0.90 × $120,000)	108,000	Long-Term Debt	(180,000)
Inventory (0.90 × $160,000)	144,000	Preferred Stock	(80,000)
Land and Buildings (1.30 × $150,000)	195,000	Available for *CS*	$302,000
Machinery & Equip. (0.70 × $250,000)	175,000		
Liq. Value of Assets	$722,000		

$$\text{Liquidation value per share} = \frac{\text{Liquidation value of assets}}{\text{Number of shares outstanding}}$$

$$\text{Liquidation value per share} = \frac{\$302{,}000}{10{,}000} = \$30.20 \text{ per share}$$

c. Liquidation value is below book value per share and represents the minimum value for the firm. It is possible for liquidation value to be greater than book value if assets are undervalued. Generally, they are overvalued on a book value basis, as is the case here.

P7-18. Valuation with price/earnings multiples

LG 5; Basic

Firm	**EPS × *P*/*E***	=	**Stock Price**
A	3.0 × (6.2)	=	$18.60
B	4.5 × (10.0)	=	$45.00
C	1.8 × (12.6)	=	$22.68
D	2.4 × (8.9)	=	$21.36
E	5.1 × (15.0)	=	$76.50

P7-19. Management action and stock value: $P_0 = D_1 \div (r_s - g)$

LG 6; Intermediate

a. $P_0 = \$3.15 \div (0.15 - 0.05) = \$31.50$

b. $P_0 = \$3.18 \div (0.14 - 0.06) = \$39.75$

c. $P_0 = \$3.21 \div (0.17 - 0.07) = \$32.10$

d. $P_0 = \$3.12 \div (0.16 - 0.04) = \$26.00$

e. $P_0 = \$3.24 \div (0.17 - 0.08) = \$36.00$

The best alternative in terms of maximizing share price is b.

P7-20. Integrative—risk and valuation and CAPM formulas

LG 4, 6; Intermediate

$P_0 = D_1 \div (r_s - g)$

$\$50 = \$3.00 \div (r_s - 0.09)$

$r_s = 0.15$

r_s = risk-free rate + risk premium

$0.15 = 0.09 + \text{risk premium}$

$0.15 - 0.09 = 0.06 = \text{risk premium}$

P7-21. Integrative—risk and valuation

LG 4, 6; Challenge

a. $14\% - 10\% = 4\%$

b. N = 6, PV = –$1.73, FV = $2.45

Solve for g: I = 5.97%

$P_0 = D_1 \div (r_s - g)$

$P_0 = \$2.60 \div (0.148 - 0.0597)$

$P_0 = \$29.45$

c. A decrease in the risk premium would decrease the required rate of return, which in turn would increase the price of the stock.

P7-22. Integrative—risk and valuation

LG 4, 6; Challenge

a. Estimate growth rate:

N = 5, PV = $2.45, FV = $3.44

Solve for I = 7.02%

$r_s = 0.09 + 0.05 = 0.14$

$D_1 = (\$3.44 \times 1.0702) = \$3.68$

$P_0 = \$3.68 \div (0.14 - 0.0702)$

$P_0 = \$52.72$

b. (1) $r_s = 0.14$

$D_1 = \$3.61(\$3.44 \times 1.0502) =$

$P_0 = \$3.61 \div (0.14 - 0.0502)$

$P_0 = \$40.20$ per share

(2) $r_s = 0.09 + 0.04 = 0.13$

$D_1 = \$3.68$

$P_0 = \$3.68 \div (0.13 - 0.0702)$

$P_0 = \$61.54$ per share

Price is a function of the current dividend, expected dividend growth rate, and the risk-free rate, and the company-specific risk premium. For Craft, the lowering of the dividend growth rate reduced future cash flows resulting in a reduction in share price. The decrease in the risk premium reflected a reduction in risk leading to an increase in share price.

P7-23. Ethics problem

LG 4; Intermediate

a. This is a zero-growth dividend valuation problem, so:

$P_0 = D/r = \$5/0.11 = \$45.45$

b. Using the new discount rate of 12% (11% + 1% credibility risk premium), we have:

$P_0 = D/r = \$5/0.12 = \$41.67$

The value decline is the difference between parts a and b:

Value decline = \$41.67 – \$45.45

= –\$3.78

The stock sells for almost \$4 less because the company's financial reports cannot be fully trusted. Lack of integrity is seen to hurt stock prices because of the credibility premium.