$$\text{Assets} = \text{Liabilities} + \text{Shareholders' equity} \quad [2.1]$$

$$\text{Revenues} - \text{Expenses} = \text{Income} \quad [2.2]$$

$$\text{Cash flow from assets} = \text{Cash flow to bondholders} + \text{Cash flow to shareholders} \quad [2.3]$$

$$\text{Current ratio} = \text{Current assets}/\text{Current liabilities} \quad [3.1]$$

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}} \quad [3.2]$$

$$\text{Cash ratio} = \text{Cash}/\text{Current liabilities} \quad [3.3]$$

$$\text{Net working capital to total assets} = \text{Net working capital}/\text{Total assets} \quad [3.4]$$

$$\text{Interval measure} = \text{Current assets}/\text{Average daily operating costs} \quad [3.5]$$

$$\begin{aligned}\text{Total debt ratio} &= [\text{Total assets} - \text{Total equity}]/\text{Total assets} \\ &= [\$3{,}588 - 2{,}591]/\$3{,}588 = .28\end{aligned} \quad [3.6]$$

$$\begin{aligned}\text{Debt/equity ratio} &= \text{Total debt}/\text{Total equity} \\ &= \$.28/\$.72 = .39\end{aligned} \quad [3.7]$$

$$\begin{aligned}\text{Equity multiplier} &= \text{Total assets}/\text{Total equity} \\ &= \$1/\$.72 = 1.39\end{aligned} \quad [3.8]$$

$$\begin{aligned}\text{Long-term debt ratio} &= \frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}} \\ &= \$457/[\$457 + 2{,}591] = \$457/\$3{,}048 = .15\end{aligned} \quad [3.9]$$

$$\begin{aligned}\text{Times interest earned ratio} &= \text{EBIT}/\text{Interest} \\ &= \$691/\$141 = 4.9 \text{ times}\end{aligned} \quad [3.10]$$

$$\begin{aligned}\text{Cash coverage ratio} &= [\text{EBIT} + \text{Depreciation}]/\text{Interest} \\ &= [\$691 + 276]/\$141 = \$967/\$141 = 6.9 \text{ times}\end{aligned} \quad [3.11]$$

$$\begin{aligned}\text{Inventory turnover} &= \text{Cost of goods sold}/\text{Inventory} \\ &= \$1{,}344/\$422 = 3.2 \text{ times}\end{aligned} \quad [3.12]$$

$$\begin{aligned}\text{Days' sales in inventory} &= 365 \text{ days}/\text{Inventory turnover} \\ &= 365/3.2 = 114 \text{ days}\end{aligned} \quad [3.13]$$

$$\begin{aligned}\text{Receivables turnover} &= \text{Sales}/\text{Accounts receivable} \\ &= \$2{,}311/\$188 = 12.3 \text{ times}\end{aligned} \quad [3.14]$$

$$\begin{aligned}\text{Days' sales in receivables} &= 365 \text{ days}/\text{Receivables turnover} \\ &= 365/12.3 = 30 \text{ days}\end{aligned} \quad [3.15]$$

$$\begin{aligned}\text{NWC turnover} &= \text{Sales}/\text{NWC} \\ &= \$2{,}311/(\$708 - \$540) = 13.8 \text{ times}\end{aligned} \quad [3.16]$$

Fixed asset turnover = Sales/Net fixed assets **[3.17]**
= $2,311/$2,880 = .80 times

Total asset turnover = Sales/Total assets **[3.18]**
= $2,311/$3,588 = .64 times

Profit margin = Net income/Sales **[3.19]**
= $363/$2,311 = 15.7%

Return on assets = Net income/Total assets **[3.20]**
= $363/$3,588 = 10.12%

Return on equity = Net income/Total equity **[3.21]**
= $363/$2,591 = 14%

P/E ratio = Price per share/Earnings per share **[3.22]**
= $157/$11 = 14.27 times

Market-to-book ratio = Market value per share/Book value per share **[3.23]**
= $157/($2,591/33) = $157/$78.5 = 2 times

ROE = Net income/Sales × Sales/Assets × Assets/Equity **[3.24]**
= Profit margin × Total asset turnover × Equity multiplier

Dividend payout ratio = Cash dividends/Net income **[4.1]**
= $44/$132
= 33⅓%

EFN = Increase in total assets – Addition to retained earnings **[4.2]**
$= A(g) - p(S)R \times (1 + g)$

$EFN = -p(S)R + [A - p(S)R] \times g$ **[4.3]**

$EFN = -p(S)R + [A - p(S)R] \times g$ **[4.4]**
$g = pS(R)/[A - pS(R)]$
$= .132(\$500)(2/3)/[\$500 - .132(\$500)(2/3)]$
$= 44/[500 - 44]$
$= 44/456 = 9.65\%$

$$\text{Internal growth rate} = \frac{ROA \times R}{1 - ROA \times R}$$ **[4.5]**

EFN = Increase in total assets – Addition to retained earnings **[4.6]**
– New borrowing
$= A(g) - p(S)R \times (1 + g) - pS(R) \times (1 + g)[D/E]$
EFN = 0

$g^* = ROE \times R/[1 - ROE \times R]$ **[4.7]**

$$g^* = \frac{p(S/A)(1 + D/E) \times R}{1 - p(S/A)(1 + D/E) \times R}$$ **[4.8]**

$$\text{EFN} = \text{Increase in total assets} - \text{Addition to retained earnings} - \text{New borrowing}$$
$$= A(g) - p(S)R \times (1 + g) - pS(R) \times (1 + g)[D/E]$$ **[4A.1]**

$$\text{ROE} = p(S/A)(1 + D/E)$$
$$g^* = \frac{ROE \times R}{1 - ROE \times R}$$ **[4A.2]**

$$\text{Future value} = \$1 \times (1 + r)^t$$ **[5.1]**

$$\text{PV} = \$1 \times [1/(1 + r)^t] = \$1/(1 + r)^t$$ **[5.2]**

$$\text{PV} \times (1 + r)^t = \text{FV}_t$$
$$\text{PV} = \text{FV}_t/(1 + r)^t = \text{FV}_t \times [1/(1 + r)^t]$$ **[5.3]**

$$\text{Annuity present value} = C \times \left(\frac{1 - \text{Present value factor}}{r}\right)$$
$$= C \times \left\{\frac{1 - [1/(1 + r)^t]}{r}\right\}$$ **[6.1]**

$$\text{Annuity due value} = \text{Ordinary annuity value} \times (1 + r)$$ **[6.1]**

$$\text{EAR} = [1 + (\text{Quoted rate}/m)]^m - 1$$ **[6.2]**

$$\text{EAR} = e^q - 1$$ **[6.3]**

$$\text{Bond value} = C \times (1 - 1/(1 + r)^t)/r + F/(1 + r)^t$$ **[7.1]**

$$1 + R = (1 + r) \times (1 + h)$$ **[7.2]**

$$1 + R = (1 + r) \times (1 + h)$$
$$R = r + h + r \times h$$ **[7.3]**

$$\text{R} \approx r + h$$ **[7.4]**

$$\text{NPV} = (c_o - c_N)/c_N \times \$1{,}000 - CP$$ **[7C.1]**

$$\text{OCF} = \text{EBIT} + D - \text{Taxes}$$
$$= (S - C - D) + D - (S - C - D) \times T_c$$
$$= \$200 + 600 - 80 = \$720$$ **[10.1]**

$$\text{OCF} = (S - C - D) + D - (S - C - D) \times T_c$$
$$= (S - C - D) \times (1 - T_c) + D$$
$$= \text{Project net income} + \text{Depreciation}$$
$$= \$120 + 600$$
$$= \$720$$ **[10.2]**

$$\begin{aligned} \text{OCF} &= (S - C - D) + D - (S - C - D) \times T_c \\ &= (S - C) - (S - C - D) \times T_c \\ &= \text{Sales} - \text{Costs} - \text{Taxes} \\ &= \$1{,}500 - 700 - 80 = \$720 \end{aligned} \quad \textbf{[10.3]}$$

$$\begin{aligned} \text{OCF} &= (S - C - D) + D - (S - C - D) \times T_c \\ &= (S - C) \times (1 - T_c) + D \times T_c \end{aligned} \quad \textbf{[10.4]}$$

$$\begin{aligned} S - VC &= FC + D \\ P \times Q - v \times Q &= FC + D \\ (P - v) \times Q &= FC + D \\ Q &= (FC + D)/(P - v) \end{aligned} \quad \textbf{[11.1]}$$

$$\begin{aligned} \text{OCF} &= [(P - v) \times Q - FC - D] + D \\ &= (P - v) \times Q - FC \end{aligned} \quad \textbf{[11.2]}$$

$$Q = (FC + OCF)/(P - v) \quad \textbf{[11.3]}$$

Total dollar return = Dividend income + Capital gain (or loss) **[12.1]**

Total cash if stock is sold = Initial investment + Total return **[12.2]**
= \$3,700 + 518
= \$4,218

$$Var(R) = (1/(T - 1))\ [(R_1 - \overline{\text{R}})^2 + \ldots + (R_T - \overline{\text{R}})^2] \quad \textbf{[12.3]}$$

Risk premium = Expected return – Risk-free rate **[13.1]**
= $\text{E}(R_U) - R_f$
= 20% – 8%
= 12%

$$\text{E}(R) = \sum_j O_j \times P_j \quad \textbf{[13.2]}$$

$$\begin{aligned} \sigma^2 &= \textstyle\sum_j [O_j - \text{E}(R)]^2 \times P_j \\ \sigma &= \sqrt{\sigma^2} \end{aligned} \quad \textbf{[13.3]}$$

$$\text{E}(R_P) = x_1 \times \text{E}(R_1) + x_2 \times \text{E}(R_2) + \ldots + x_n \times \text{E}(R_n) \quad \textbf{[13.4]}$$

$$\begin{aligned} \sigma^2_P &= x^2_L\sigma^2_L + x^2_U\sigma^2_U + 2x_L \times {}_U\text{CORR}_{L,U}\sigma_L\sigma_U \\ \sigma_P &= \sqrt{\sigma^2_P} \end{aligned} \quad \textbf{[13.5]}$$

Total return = Expected return + Unexpected return **[13.6]**
$R = \text{E}(R) + U$

Announcement = Expected part + Surprise **[13.7]**

R = E(R) + Systematic portion + Unsystematic portion. **[13.8]**

Total risk = Systematic risk + Unsystematic risk **[13.9]**

$$E(R_i) = R_f + [E(R_M) - R_f] \times \beta_i \quad \textbf{[13.10]}$$

$$R = E(R) + \beta_I F_I + \beta_{GNP} F_{GNP} + \beta_r F_r + \epsilon \quad \textbf{[13.11]}$$

$$E(R) = R_F + E[(R_1) - R_F]\beta_1 + E[(R_2) - R_F]\beta_2 + E[(R_3) - R_F]\beta_3 + \ldots E[(R_K) - R_F]\beta_K \quad \textbf{[13.12]}$$

$$\sigma^2_P = x^2_L \sigma^2_L + x^2_U \sigma^2_U + 2x_L x_U \text{CORR}_{L,U} \sigma_L \sigma_U \quad \textbf{[13A.1]}$$

$$\sigma^2_P \sum_{i=1}^{N} \sum_{j=1}^{N} x_j \sigma_{ij} \quad \textbf{[13A.2]}$$

$$\frac{\delta \sigma^2_P}{\delta x_2} = 2\sum_{j=1}^{N} x_j \sigma_{i2} = 2[x_1 \text{COV}(R_1,R_2) + x_2 \sigma^2_2 + x_3\ \text{COV}(R_3,R_2) \quad \textbf{[13A.3]}$$

$$\beta_2 = \frac{\text{COV}(R_2,R_M)}{\sigma^2(R_M)} \quad \textbf{[13A.4]}$$

$$R_E = (D_1/P_0) + g \quad \textbf{[14.1]}$$

$$R_E = R_f + \beta_E \times [R_M - R_f] \quad \textbf{[14.2]}$$

$$R_P = D/P_0 \quad \textbf{[14.3]}$$

$$V = E + D \quad \textbf{[14.4]}$$

$$100\% = E/V + D/V \quad \textbf{[14.5]}$$

$$\text{WACC} = (E/V) \times R_E + (D/V) \times R_D \times (1 - T_C) \quad \textbf{[14.6]}$$

$$\begin{aligned} f_A &= (E/V) \times f_E + (D/V) \times f_D \\ &= 60\% \times .10 + 40\% \times .05 \\ &= 8\% \end{aligned} \quad \textbf{[14.7]}$$

$$\beta_{Portfolio} = \beta_{Levered\ firm} = \frac{\text{Debt}}{\text{Debt + Equity}} \times \beta_{Debt} + \frac{\text{Equity}}{\text{Debt + Equity}} \times \beta_{Equity} \quad \textbf{[14A.1]}$$

$$\beta_{Unlevered\ firm} = \frac{\text{Equity}}{\text{Debt + Equity}} \times \beta_{Equity} \quad \textbf{[14A.2]}$$

$$\beta_{Unlevered\ firm} = \frac{\text{Equity}}{\text{Equity} + (1 - T_C) \times \text{Debt}} \times \beta_{Equity} \quad \textbf{[14A.3]}$$

Number of new shares = Funds to be raised/Subscription price **[15.1]**
= $5,000,000/$10 = 500,000 shares

Number of rights needed to buy a share of stock = Old shares/New shares **[15.2]**
= 1,000,000/500,000 = 2 rights

$R_o = (M_o - S)/(N + 1)$ **[15.3]**

$M_e = M_o - R_o$ **[15.4]**

$R_e = (M_e - S)/N$ **[15.5]**

$$\text{Degree of financial levrage} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$ **[16.1]**

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}}$$ **[16.2]**

$V_u = EBIT/R_E{}^u = V_L = E_L + D_L$ **[16.3]**

$R_E = R_A + (R_A - R_D) \times (D/E)$ **[16.4]**

$\beta_E = \beta_A \times (1 + D/E)$ **[16.5]**

$\text{Value of the interest tax shield} = (T_C \times R_D \times D)/R_D$
$= T_C \times D$ **[16.6]**

$V_L = V_U + T_C \times D$ **[16.7]**

$R_E = \rho + (\rho - R_D) \times (D/E) \times (1 - T_C)$ **[16.8]**

$$V_L = V_U + \left[1 - \frac{(1 - T_C) \times (1 - T_S)}{(1 - T_b)}\right] \times B$$ **[16A.1]**

Net working capital + Fixed assets = Long-term debt + Equity **[18.1]**

Net working capital = (Cash + Other current assets) – Current liabilities **[18.2]**

Cash = Long-term debt + Equity + Current liabilities – Current assets (other than cash) – Fixed assets **[18.3]**

Operating cycle = Inventory period + Accounts receivable period **[18.4]**
105 days = 60 days + 45 days

Cash cycle = Operating cycle – Accounts payable period **[18.5]**
75 days = 105 days – 30 days

Cash collections = Beginning accounts receivable + 1/2 × Sales **[18.6]**

Average daily float = Average daily receipts × Weighted average delay **[19.1]**
= $266,666.67 × 7.50 days = $2,000,000

Opportunity costs $= (C/2) \times R$ **[19A.1]**

Trading costs $= (T/C) \times F$ **[19A.2]**

$$\text{Total cost} = \text{Opportunity costs} + \text{Trading costs} = (C/2) \times R + (T/C) \times F \quad [19A.3]$$

$$C^* = \sqrt{(2T \times F)/R} \quad [19A.4]$$

$$C^* = L + (3/4 \times F \times \sigma^2/R)^{1/3} \quad [19A.5]$$

$$U^* = 3 \times C^* - 2 \times L \quad [19A.6]$$

$$\text{Average cash balance} = (4 \times C^* - L)/3 \quad [19.A7]$$

$$\text{Accounts receivable} = \text{Average daily sales} \times \text{ACP} \quad [20.1]$$

$$\text{Cash flow (old policy)} = (P - v)Q = (\$49 - 20) \times 100 = \$2{,}900 \quad [20.2]$$

$$\text{Cash flow (new policy)} = (P - v)Q' = (\$49 - 20) \times 110 = \$3{,}190 \quad [20.3]$$

$$\text{PV} = [(P - v)(Q' - Q)]/R \quad [20.4]$$

$$\text{Cost of switching} = PQ + v(Q' - Q) \quad [20.5]$$

$$\text{NPV of switching} = -[PQ + v(Q' - Q)] + (P - v)(Q' - Q)/R \quad [20.6]$$

$$\text{NPV} = 0 = -[PQ + v(Q' - Q)] + (P - v)(Q' - Q)/R \quad [20.7]$$
$$Q' - Q = (PQ)/[(P - v)/R - v]$$

$$\text{NPV} = -v + (1 - \pi)P'/(1 + R) \quad [20.8]$$

$$\text{NPV} = -v + (1 - \pi)(P - v)/R \quad [20.9]$$

$$\text{Score} = Z = 0.4 \times [\text{Sales/Total assets}] + 3.0 \times \text{EBIT/Total assets} \quad [20.10]$$

$$\text{Total carrying costs} = \text{Average inventory} \times \text{Carrying costs per unit} = (Q/2) \times CC \quad [20.11]$$

$$\text{Total restocking cost} = \text{Fixed cost per order} \times \text{Number of orders} = F \times (T/Q) \quad [20.12]$$

$$\text{Total costs} = \text{Carrying costs} + \text{Restocking costs} = (Q/2) \times CC + F \times (T/Q) \quad [20.13]$$

$$\text{Carrying costs} = \text{Restocking costs} \quad [20.14]$$
$$(Q^*/2) \times CC = F \times (T/Q^*)$$

$$Q^{*2} = \frac{2T \times F}{CC} \quad [20.15]$$

$$Q^* = \sqrt{\frac{2T \times F}{CC}}$$ **[20.16]**

$$Q^* = \sqrt{\frac{2T \times F}{CC}}$$ **[20.17]**

$$= \sqrt{\frac{(2 \times 46{,}800) \times \$50}{\$.75}}$$

$$= \sqrt{6{,}240{,}000}$$

$$= 2{,}498 \text{ units}$$

$$\text{EOQ}^* = \sqrt{\frac{2T \times F}{CC}}$$ **[20.18]**

$$= \sqrt{\frac{(2 \times 600) \times \$20}{\$3}}$$

$$= \sqrt{8{,}000}$$

$$= 89.44 \text{ units}$$

$$\text{Net incremental cash flow} = P'Q \times (d - \pi)$$ **[20A.1]**

$$\text{NPV} = -PQ + P'Q \times (d - \pi)/R$$ **[20A.2]**

$$(\text{E}[S_1] - S_0)/S_0 = h_{FC} - h_{CDN}$$ **[21.1]**

$$\text{E}[S_1] = S_0 \times [1 + (h_{FC} - h_{CDN})]$$ **[21.2]**

$$\text{E}[S_t] = S_0 \times [1 + (h_{FC} - h_{CDN})]^t$$ **[21.3]**

$$F_1/S_0 = (1 + R_{FC})/(1 + R_{CDN})$$ **[21.4]**

$$(F_1 - S_0)/S_0 = R_{FC} - R_{CDN}$$ **[21.5]**

$$F_1 = S_0 \times [1 + (R_{FC} - R_{CDN})]$$ **[21.6]**

$$F_t = S_0 \times [1 + (R_{FC} - R_{CDN})]^t$$ **[21.7]**

$$\text{E}[S_1] = S_0 \times [1 + (R_{FC} - R_{CDN})]$$ **[21.8]**

$$\text{E}[S_t] = S_0 \times [1 + (R_{FC} - R_{CDN})]^t$$ **[21.9]**

$$R_{CDN} - h_{CDN} = R_{FC} - h_{FC}$$ **[21.10]**

$$\text{NPV} = V_B^* - \text{Cost to Firm A of the acquisition}$$ **[23.1]**

$$C_1 = 0 \text{ if } (S_1 - E) \leq 0$$ **[25.1]**

$$C_1 = S_1 - E \text{ if } (S_1 - E) > 0$$ **[25.2]**

$$C_0 \leq S_0 \quad [25.3]$$

$$C_0 \geq 0 \text{ if } S_0 - E < 0 \quad [25.4]$$
$$C_0 \geq S_0 - E \text{ if } S_0 - E \geq 0$$

$$S_0 = C_0 + E/(1 + R_f) \quad [25.5]$$
$$C_0 = S_0 - E/(1 + R_f)$$

Call option value = Stock value – Present value of the exercise price **[25.6]**

$$C_0 = S_0 - E/(1 + R_f)^t$$

$$C_0 = S_0 \times N(d_1) - E/(1 + R_f)^t \times N(d_2) \quad [25A.1]$$

$$d_1 = [\ln(S_0/E) + (R_f + 1/2 \times \sigma^2) \times t]/[\sigma \times \sqrt{t}] \quad [25A.2]$$
$$d_2 = d_1 - \sigma \times \sqrt{t}$$