**DIVIDEND DISCOUNT MODELS**

**Problem 1**
A. False. The dividend discount model can still be used to value the dividends that the company will pay after the high growth eases.
B. False. It depends upon the assumptions made about expected future growth and risk.
C. False. This will be true only if the stock market falls more than merited by changes in the fundamentals (such as growth and cash flows).
D. True. Portfolios of stocks that are undervalued using the dividend discount model seem to earn excess returns over long time periods.
E. True. The model is biased towards these stocks because of its emphasis on dividends.

**Problem 2**
A. Cost of Equity = 6.25% + 0.90 * 5.5% = 11.20%
   Value Per Share = $3.56 * 1.055/(.1120 - .055) = $65.89

B. $3.56 (1 + g)/(.1120 - g) = $80
   Solving for g,
   \[ g = \frac{(80 \times .112 - 3.56)}{(80 + 3.56)} = 6.46\% \]

**Problem 3**
A. Retention Ratio = 1 - Payout Ratio = 1 - 0.42/1.50 = 72%
   Return on Capital
   \[ = \frac{\text{Net Income} + \text{Int Exp (1-t)}}{\text{BV of Debt} + \text{BV of Equity}} \]
   \[ = \frac{30 + 0.8 \times (1 - 0.385)}{7.6 + 160} = 18.19\% \]
   Debt/Equity Ratio = 7.6/160 = .0475
   Interest Rate on Debt = 0.8/7.6 = 10.53%
   Expected Growth Rate
   \[ = 0.72 \times 0.1875 = 13.5\% \]
   Alternatively, and much more simply,
   Return on Equity = 30/160 = .1875
   Expected Growth Rate = 0.72 * .1875 = 13.5%

B. Expected payout ratio after 1998:
   \[ = 1 - \frac{g}{\text{ROC} + \text{D/E} \times (\text{ROC} - i \times (1-t))} \]
   \[ = 1 - 0.06/(.125+.25(.125 - .07(1-.385))) \]
C. Beta in 1993 = 0.85
   Unlevered Beta = 0.85/(1 + (1 - 0.385) * 0.05) = 0.8246
   Beta After 1998 = 0.8246 * (1 + (1 - 0.385) * 0.25) = 0.95

D. Cost of Equity in 1999 = 7% + 0.95 * 5.5% = 12.23%
   Expected Dividend in 1999
   = ( $1.50 * 1.1355 * 1.06) * 0.5876 = $1.76
   Expected Price at End of 1998 = $1.76/(.1223 - .06) = $28.25

E.

<table>
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<th>Year</th>
<th>EPS</th>
<th>DPS</th>
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<tr>
<td>1994</td>
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<td>1995</td>
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<tr>
<td>1996</td>
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<td>1997</td>
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<td>1998</td>
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Cost of Equity = 7% + 0.85 * 5.5% = 11.68%
PV of Dividends and Terminal Price (@ 11.68%) = $18.47

F. Total Value per Share = $18.47
   Value Per Share Using Gordon Growth Model
   = $1.50 * 1.06 * 0.5876/(.1223 - .06) = $15.00
   Value Per Share With No Growth = $1.50 * 0.5876/.1223 = $7.21
   Value of Extraordinary Growth = $18.47 - $15.00 = $3.47
   Value of Stable Growth = $15.00 - $7.21 = $7.79

Problem 4

A. Cost of Equity = 6.25% + 0.85 * 5.5% = 10.93%
   Value of Stable Growth = $0.48 * 1.07/(.1093 - .07) = $13.07

B. Value of Extraordinary Growth
   = $0.48 * (6/2) * (.25 - .07)/(.1093 - .07) = $6.60

C. The payout ratio is assumed to remain unchanged as the growth rate changes. The payout ratio in this case is assumed to remain at 60% (0.48/0.80).
Problem 5

A.

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B. Expected Price at End of 2003

\[ \frac{($13.34 \times 1.06 \times 0.60)}{0.1175 - 0.06} = \$147.54 \]

(Cost of Equity = 6.25% = 5.5% = 11.75%)

C.

PV of Dividends - High Growth = $3.67
PV of Dividends - Transition = $9.10
PV of Terminal Price = $44.59
Value Per Share = $57.36

Problem 6

a. Dividends = $20 million

Value of equity = $20 \times \frac{1.05}{0.12 - 0.05} = $300 million

b. Average annual stock buyback = $180/4 = $45 million

Modified dividends = $65 million

Value of equity = $65 \times \frac{1.05}{0.12 - 0.05} = $975 million