ASSIGNMENT #3

Question 1

(a) **(2 marks)**

Expected Return:

$E[R_p]$ = .4(13) + (1 − .4)(15) = .4(13) + .6(15) = 5.2 + 9.0 = 14.2%

Standard Deviation:

$$\sigma_P = \sqrt{(.4)^2(19)^2 + (.6)^2(25)^2 + 2(.4)(.6)(-.1)(19)(25)}$$
$$\sigma_P = \sqrt{(.16)(361) + (.36)(625) - 22.8}$$
$$\sigma_P = \sqrt{57.76 + 225 - 22.8}$$
$$\sigma_P = \sqrt{259.96}$$
$$\sigma_P = 16.12\%$$

(b) **(2 marks)**

(i) Diversification reduces risk in a portfolio of multiple securities as long as the securities are less than perfectly positively correlated (correlation coefficient ≠ +1.0).

(ii) This portfolio does exhibit diversification benefits as the correlation coefficient is −0.1.

(c) **(2 marks)**

The weighted-average of the two stocks' standard deviations
= .4(19%) + .6(25%) = 7.6% + 15% = 22.6%

The actual standard deviation of the portfolio is 16.12% (from part (a)). Thus, the risk of the portfolio (16.12%) is less than the weighted-average risk of the stocks in the portfolio (22.6%), indicating "benefits of diversification".

Question 2 (2 marks)

$$E[R_P] = W_A E[R_A] + W_B E[R_B]$$
$$13.5 = W_A(15) + W_B(10)$$
$$13.5 = W_A(15) + (1 - W_A)(10)$$
$$13.5 = 15W_A + 10 - 10W_A$$
$$3.5 = 5W_A$$
$$W_A = .7$$
$$\therefore W_B = 1 - .7 = .3$$

$$\sigma_P = \sqrt{(.7)^2(20)^2 + (.3)^2(15)^2 + 2(.7)(.3)(.6)(20)(15)}$$
$$\sigma_P = \sqrt{(.49)(400) + (.09)(225) + 75.6}$$
$$\sigma_P = \sqrt{196 + 20.25 + 75.6}$$
$$\sigma_P = \sqrt{291.85}$$
$$\sigma_P = 17.08$$

Question 3 (4 marks)

Stock A:

According to CAPM; $E[R_A] = 3\% + 1.4(10\% - 3\%)$ = 12.8%

According to CAPM, the expected return on A will have to decrease from 14% to 12.8%. This decrease is accomplished through an increase in the stock price. Therefore, you should buy Stock A now.

Stock A is UNDERpriced because, if you believe in CAPM, the stock is offering you a higher return (14%) than you should be getting under CAPM (12.8%). Thus, investors (who believe in CAPM) will BUY Stock A which will cause the price to increase to its "equilibrium" CAPM price.

Stock B:

According to CAPM; $E[R_B] = 3\% + 2(7\%)$ = 17%

According to CAPM, the expected return on B will have to increase from 14% to 17%. This increase is accomplished through a decrease in the stock price. Therefore, you should sell Stock B now.

Stock B is OVERpriced because, if you believe in CAPM, the stock is offering you a lower return (14%) than you should be getting under CAPM (17%). Thus, investors (who believe in CAPM) will SELL Stock B which will cause the price to decrease to its "equilibrium" CAPM price.

Question 4

(a) **(1 mark)**

Using CAPM, the expected return on the stock (Rj) is calculated as follows:

"Market price of risk" = $R_m - R_f = 6\%$

$$R_j = R_f + \beta_j (R_m - R_f)$$

$$= 4 + 1.2(6) = 11.2\%$$

(b) **(1 mark)**

Price = PV of all future cash flows

$12 = \frac{D_1 + 12}{1.112}$ and D1 = (12)(1.112) – 12 = 1.34

(c) **(2 marks)**

$$r = \frac{D_1 + (P_1 - P_0)}{P_0} = \frac{0.5 + (13 - 12)}{12} = 12.5\%$$

Since the stock has an expected return (12.5%) that is greater than the required return per CAPM (11.2%), I would recommend the purchase of this stock.

ALTERNATIVELY:

Using $r = \frac{Div_1 + (P_1 - P_0)}{P_0}$

1. Given that $DIV_1 = 0.5$ and $P_1 = 13$, in order to earn a return of 11.2%, P_0 should be (0.50 + 13) ÷ 1.112 = 12.14. Since it currently trades at $12, it is underpriced and you would recommend the purchase of this stock.

2. Given that $DIV_1 = 0.5$ and $P_0 = 12$, in order to earn a return of 11.2%, P_1 should be (12)(1.112) − 0.5 = 12.84. Since it is expected to trade at $13 at the end of the year, you would recommend the purchase of this stock.

Question 5 (4 marks)

"Currently paying dividend", thus $D_0 = 2.50$

Current return per CAPM = 7 + 1.5(15 – 7) = 7 + 12 = 19%

Current price per DGM = $D_1 \div (r - g)$ = **2.5(1.06)** ÷ (.19 – .06) = **2.65** ÷ .13 = 20.38

New return per CAPM = 7 + 1.75(15 – 7) = 7 + 14 = 21%

New price per DGM = $D_1 \div (r - g) = 2.5(1 + g) \div (.21 - g)$ = 20.38 (the current price)

Solving for g, we get: $\frac{\mathbf{2.5(1 + g)}}{.21 - g} = 20.38$

2.5 (1 + g) = 20.38(.21 – g)
2.5 + 2.5 g = 4.2798 – 20.38g
22.88g = 1.7798
g = 1.7798 ÷ 22.88 = .0778 = .08