5pm Midterm 2

MC Answers: 1: B (Risk premium = $R - R_{rf} = 16 - 8.6 = 7.4$)

2: E 3: C 4: E

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5. a) $\bar{R}_A = .6 \cdot 5\% + .4 \cdot 4\% = \boxed{4.6\%}$ $\bar{R}_B = .6 \cdot 8\% + .4 \cdot 12\% = \boxed{9.6\%}$

b). $\sigma_A^2 = .6(5-4.6)^2 + .4(4-4.6)^2 = .24$ $\sigma_A = \sqrt{\sigma_A^2} = \boxed{.49}$

$\sigma_B^2 = .6(8-9.6)^2 + .4(12-9.6)^2 = 3.84$ $\sigma_B = \sqrt{\sigma_B^2} = \boxed{1.96}$

c). $\sigma_{AB} = .6(5-4.6)(8-9.6) + .4(4-4.6)(12-9.6) = -.96$

$\rho_{AB} = \frac{\sigma_{AB}}{\sigma_A \sigma_B} = \frac{-.96}{(.49)(1.96)} = -1$ (possible rounding issues, should get exactly -1).

6). $R_B = 6\%$ $\frac{1}{2}R_A + \frac{1}{2}R_B = 8.5\% \Rightarrow \frac{1}{2}R_A + 3\% = 8.5\% \Rightarrow R_A = 11\%$

So a) $R_p = -\frac{1}{2}(11) + \frac{3}{2}(6) = \boxed{3.5\%}$ b) $\boxed{11\%}$ c) $\boxed{13.5\%}$

d). Know $\sigma_B = 8\%$, and $R_p = 16\%$ with 150% A, -50% B.

So $\sigma_p^2 = X_A^2\sigma_A^2 + 2X_AX_B\sigma_A\sigma_B\rho_{AB} + X_B^2\sigma_B^2$

$(.16)^2 = (1.5)^2\sigma_A^2 + 2(1.5)(-.5)(\sigma_A)(.08)(.25) + (-.5)^2(.08)^2$ Multiply both sides by 10000 (use 8, not .08)

$256 = 2.25\sigma_A^2 + (-3)\sigma_A + 16$, divide by 2.25

$\sigma_A^2 - 1.3\bar{3}\sigma_A - 106.\bar{6} = 0$

$\sigma_A = \frac{1.3\bar{3} \pm \sqrt{(1.3\bar{3}) - 4 \cdot (-106.\bar{6})}}{2}$, take true root;

$\boxed{\sigma_A = 11.01\%}$

6 e). $R_{rf} = 2\%$, $EMRP = 8\%$.

$R_A = R_{rf} + \beta_A \cdot EMRP \qquad 11\% = 2\% + \beta(8\%) \Rightarrow \beta_A = 9/8 = \boxed{1.125}$

$R_B = 6\% = 2\% + \beta(8\%) \Rightarrow \beta = 4/8 = \boxed{.5}$

f). $\sigma_M = 5\%$ $\qquad \beta_A = \dfrac{\sigma_{AM}}{\sigma_M^2} = \dfrac{\rho_{AM}\sigma_A\sigma_M}{\sigma_M^2} = \dfrac{\rho_{AM}\sigma_A}{\sigma_M} = \dfrac{\rho_{AM}\cdot 11.01}{5} = 1.125$

$\Rightarrow \boxed{\rho_{AM} = .511}$

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7. $\beta_A = 0.4$ $\beta_B = 1.2$ $R_{rf} = 3\%$ $R_B = 14\%$

$R_B = R_{rf} + \beta(R_M - R_{rf}) \Rightarrow 14\% = 3\% + 1.2(R_M - R_{rf}) \Rightarrow R_M - R_{rf} = 9.1\overline{6}$

$\boxed{R_M = 12.1\overline{6}}$

b). $\beta_P = .4\beta_A + .6\beta_B = .4(0.4) + .6(1.2) = .88$

$R_P = 3\% + .88(9.1\overline{6}) = \boxed{11.067\%}$

8. $\dfrac{D}{E} = .25$ $\beta_E = \cancel{1.3}$ $R_{rf} = 5\%$ $EMRP = 10\%$ $T_c = 35\%$ $r_D = 6\%$

a). Need to find R_{WACC}; $R_E = R_{rf} + \beta_E \cdot EMRP = \cancel{15\%}$ 18%

$\dfrac{D}{E} = .25 \Rightarrow D = .25E \qquad \dfrac{E}{D+E} = \dfrac{E}{1.25E} = .8$

$R_{WACC} = .8 \cdot (\cancel{15\%}\ 18) + .2(6)(1-.35) = \cancel{14.78\%}$ 15.18%

$NPV = -6 + \dfrac{1}{\cancel{.148}\ .1518} = \boxed{.588}$

b). Current 80 million in equity 20 Million debt $\Rightarrow$ (after 70MM / 30MM E/D spl.7)

B_E changes though;

$\beta_A = .8\beta_E \Rightarrow \beta_A = 1.04$ $\qquad$ After $1.04 = .7 \cdot \beta_E = \boxed{\beta_E = 1.4857}$

$R_E = 5\% + 10\% \cdot \beta_E = 19.857$

c). $R_{WACC} = .7(19.857) + .3(6)(.65) = \boxed{15.07\%}$

6:30 pm Midterm

(MC) 1. $\bar{R} = \frac{-5+20+0+10+5}{5} = 6\%$ **B** 2: **B**

3). Current β: $\frac{1}{4}(1.4) + \frac{3}{4}(.6) = .8$

want overall $\beta = 1.2$ $\beta_{overall} = \frac{1}{2}(.8) + \frac{1}{2}\beta_{new} \Rightarrow \beta_{new} = 1.6$.

Need all money in $\beta = 1.6$ Asset; **A** 4. **D**

5. a) $\bar{R}_A = \frac{1}{3}(5+10-3) = 4\%$ $\sigma_A^2 = \frac{1}{3}(5-4)^2 + \frac{1}{3}(10-4)^2 + \frac{1}{3}(-3-4)^2 = 28.\overline{6}$ $\sigma_A = 5.3$

$\bar{R}_B = \frac{1}{3}(3+12+3) = 6\%$ $\sigma_B^2 = \frac{1}{3}(3-6)^2 + \frac{1}{3}(12-6)^2 + \frac{1}{3}(3-6)^2 = \frac{54}{3}$ $\sigma_B = 4.24$

(1, 36, 49 / 9, 36, 9)

b). $\sigma_{AB} = \frac{1}{3}[(5-4)(3-6) + (10-4)(12-6) + (-3-4)(3-6)] = \frac{18}{3}$

(1 · −3 = −3; 6 · 6 = +36; −7 · −3 = +21)

$\rho_{AB} = \frac{18}{(5.35)(4.24)} = .792$

6). Need Returns of each state; round to nearest percent; $R_{A0} = \frac{55.25 - 71.04}{71.04} = -22.2227\%$

	AMGN	S+P
year 0	−22	+6
1	−12	+12
2	+35	+6
3	+4	11
Avg:	1.25%	8.75%

$\beta_{AMGN} = \frac{\sigma_{AM}}{\sigma_M^2}$

$\sigma_M^2 = \frac{1}{4}[(6-8.75)^2 + (12-8.75)^2 + (6-8.75)^2 + (11-8.75)^2]$

$= 7.6875$

$\sigma_{AM} = \frac{1}{4}[(-22-1.25)(6-8.75) + (-12-1.25)(12-8.75) + (35-1.25)(6-8.75) + (4-1.25)(11-8.75)] = -16.4$

(~64, ~−43, ~−92.81, ~6.18)

$\beta_{AMGN} = -16.43/7.6875 = -2.14$

b) AMGN should Return $\beta_A = -2.14 \Rightarrow R_A = 3.5\% + (-2.14)(8.75) = -15.225\%$.

7. $\sigma_p^2 = X_R^2\sigma_R^2 + 2X_RX_Y\underbrace{\sigma_R\sigma_Y\rho_{RY}}_{\sigma_{RY}} + X_Y^2\sigma_Y^2 = (.25)^2(4)^2 + 2(.25)(.75)(.75)(4)(10) + (.75)^2(10)^2 = 68.5$

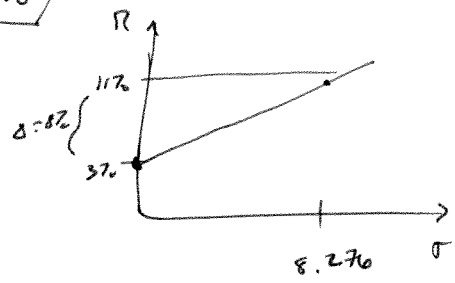
(1, 11.25, 56.25)

a) $\sigma_p = 8.276$ $\quad R_p = (.25)(8) + (.75)(12) = 11\%$

b). Need to accept $\frac{9}{8}\cdot(8.276) = 9.3105$

X_{risky} to get 12%: $\quad 12\% = 11\cdot X_{Risky} + 3X_{rf}$

$X_{Risky} + X_{rf} = 1.$



8. a). $\beta_E = .77$ $\quad R_M = 4\% + .77(12-4) = 10.16\%$

b). $\frac{D}{E} = .75 \Rightarrow D = .75E$ $\quad \frac{E}{D+E} = \frac{1}{1.75} = .571$

$\beta_A = \frac{E}{D+E}\beta_E = .44$

c) $R_{unlev} = \frac{1}{1.75}(10.16) + \frac{.75}{1.75}(5)(.67) = 7.24$

$NPV = -5 + \frac{1}{0.0724} = 8.809$