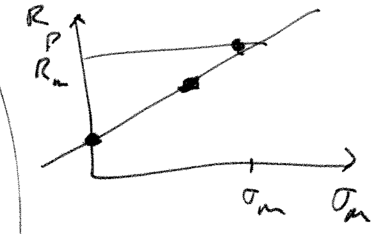
3. a). $\sigma_A = 0$

$\sigma_B = 8.5$

CML: $R_p = R_{rf} + \sigma_p \cdot \dfrac{R_M - R_{rf}}{\sigma_M}$

$9\% = 4\% + 40\%$



Slope $= \dfrac{R_M - R_{rf}}{\sigma_M}$

For σ_M;

Note $\sigma_p = X\sigma_M$ X is % of port in Risky asset.

$X = .6$

$\sigma_p = 10\% = .6\,\sigma_M \Rightarrow \sigma_M = 10/.6 = 16\tfrac{2}{3}\%$

b). $\rho_{BM} = 1$ $\quad \beta = \dfrac{\sigma_{MB}}{\sigma_M^2} = \dfrac{\rho_{BM}\sigma_M\sigma_B}{\sigma_M^2} = \dfrac{\rho_{BM}\sigma_B}{\sigma_M} = \dfrac{1 \cdot 8.5}{16.66\bar{6}} = .51$

c). R_M: $\quad 10\% = .4(4) + .6(x) \Rightarrow \dfrac{8.4}{.6} = x \Rightarrow x = 14\%$

EMRP: $14\% - 4\% = 10\%$

SML: $R_B = R_{rf} + \beta_B \cdot EMRP = 4 + .51(14) = 11.14\%$

From data $\overline{R_B} = 3 \cdot \frac{1}{2} + 20 \cdot \frac{1}{2} = 11.5$.

Gives a higher return than it "should". Underpriced.

Short a:

$\sigma_A^2 = .004 \quad \sigma_M^2 = .007 \quad \sigma_{AM}^2 = .0026 \quad \rho_{AM} = \dfrac{\sigma_{AM}^2}{\sigma_A\sigma_M} = \dfrac{.0026}{\sqrt{.007 \cdot .004}} = .49$

$X_A = X_B = \frac{1}{2}$

$\sigma_A = 6$

$\sigma_B = 12$

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

$\frac{1}{4}(6)^2 + 2(\frac{1}{4})(6)(12) \times .5 + \frac{1}{4}(12)^2 = 63$