

2/a.

$$r_A = w r_B + (1-w) r_E$$

$$r_E = \frac{r_A - w r_B}{1-w}$$

b. Since we have $r_E = \frac{r_A - w r_B}{1-w}$

$\sigma_B = 0$ (the risk free return has 0 Beta)

$$\sigma_{EM} = \frac{\sigma_{AM}}{1-w}$$

$$\beta_E = \frac{\sigma_{EM}}{\sigma_M} = \frac{1}{1-w} \frac{\sigma_{AM}}{\sigma_M} = \frac{\beta_A}{1-w}$$

c. $\bar{R}_E = r_f + \beta_E (\bar{R}_M - r_f)$

$$\bar{R}_M > r_f \quad \bar{R}_M - r_f > 0$$

$$\beta_E = \frac{\beta_A}{1-w} \quad \beta_A > 0 \quad \text{W} \uparrow \quad (1-w) \downarrow \quad \beta_E \uparrow$$

\therefore As w increases, \bar{R}_E will also increase