FN312 Quiz 3

The following output is based on estimating the CAPM regression for IBM and an equally weighted portfolio of 15 technology stocks using monthly return data over the period January 1978 to December 1982. Note that the values in parentheses represent the standard error of the intercept and slope estimates, and σ_ε is the standard error of the residuals.

$$E(r_{IBM}) = \underset{(0.006)}{0.002} + \underset{(0.103)}{0.657} * (E(r_M) - r_f)\,, \sigma_\varepsilon = 0.1472$$

$$E(r_{Port}) = \underset{(0.004)}{0.002} + \underset{(0.068)}{0.777} * (E(r_M) - r_f), \sigma_\varepsilon = 0.0311$$

a) (3 points) Based on the standard deviation of the residuals, what can you say about the risk characteristics of IBM compared to the portfolio? Does it make sense that σ_ε of the portfolio is smaller than that of IBM? Explain.

The standard deviation or residuals imply that IBM has more firm specific risk than the technology stock portfolio. This makes sense as firms specific risk in the portfolio would have been diversified away.

b) (4 points) Does CAPM hold for IBM and the portfolio? Justify your answer by testing null hypotheses.

Construct t-statistics for the alpha coefficient (intercept).
For IBM: t-stat = 0.002/0.006 = 0.33 < 1.96
For portfolio t-stat = 0.002/0.004= 0.5 < 1.96

Thus we fail to reject the null hypothesis that CAPM holds for both IBM and the portfolio. CAPM holds.

c) (3 points) If we apply the single index model to the above two regressions, what assumption is applied to the residual terms? For the IBM and the portfolio, do you think that this assumption is appropriate and would hold in the real world? Explain why or why not.

The assumption of the single index model is that the residual terms are not correlated ie. There are no industry effects. This may not be an appropriate assumption in the real world as IBM which is a technology stock may be correlated with the technology stock portfolio beyond correlation of the market.