**Econ 120B, Fall 2003, Answers to Homework #1**

Exercise 3.5

a. $X$ values being closer to their mean implies that $S_{xx}$ is smaller. From Equations 3.18 and 3.19, we see that a smaller $S_{xx}$ means a larger variance. Thus the estimates are less precisely estimated and the statement is FALSE.

b. FALSE because for unbiasedness we need Assumptions 3.3 and 3.4. Violation of Assumption 3.4 implies that unbiasedness is no longer valid.

c. Assumption 3.8 is needed only for hypothesis testing. Thus BLUE still holds and the statement is FALSE.

d. TRUE because $t$- and $F$- distributions for the test statistics were derived from the assumption of normality which is a must for hypothesis testing.

e. TRUE because the width of a confidence interval directly depends on the standard error of an estimate.

f. TRUE because if Var($X$) is large, then from equations 3.18 and 3.19 the variances will be smaller and hence confidence intervals will be narrower.

g. FALSE because a high $p$-value means rejection of $H_0$ might result in a high probability of Type I error. So we should not reject, implying that we should not conclude that the coefficient is significant.

h. TRUE because a higher level of significance means a lower value for $t^*$ and hence actual $|t_c|$ is more likely to be to the right of $t^*$. Also, a higher level of significance means a greater chance for $p$-value to be below it and hence more likely for the null hypothesis to be rejected, implying significance of a coefficient.

i. PARTLY TRUE. Violation of Assumptions 3.5 and 3.6 only affects the BLUE property. Thus estimators are still unbiased and consistent but not BLUE.

j. FALSE. The null hypothesis is a statement about whether or not the parameter has a certain value. This is either true or not true and therefore it is meaningless to attribute a probability to whether $H_0$ is true or not. However, the rejection of a true hypothesis, which is Type I error, is a random event because it can change from trial to trial. The $p$-value is the probability of making this type of mistake.