STAT525 HOMEWORK#2

1. In four sentences or less, explain what a sampling distribution is and why it is important to know the sampling distribution of a test statistic.

2. Consider the Toluca Company example of Chapter 1. On page 46, a 95% confidence interval is constructed for the slope. Suppose instead the company were interested in the increase in mean work hours for an additional 6 units in the lot. Construct the 95% confidence interval for this quantity.

3. You fit the simple linear model to a data set and obtain estimates $b_0 = 2, b_1 = 5$, and $MSE = s^2 = 1.0$

   (a) Suppose the data consisted of $n = 20$ cases and the standard error of b_1, $s(b_1)$, is equal to 2. Construct the 95% CI for β_1.

   (b) Do you have statistical evidence X helps predict Y? Explain.

   (c) The 95% confidence interval for $E(Y)$ when $X = 5$ is [23.38, 30.62]. Find the 95% prediction interval when $X = 5$.

4. KNNL Problem 2.7

5. KNNL Problem 2.16

6. KNNL Problem 2.26. Use SAS to generate the ANOVA table and in place of part (c), generate the scatterplot and comment on the linearity.

7. Given that $R^2 = \text{SSR/SSTO}$, it can be shown that $R^2/(1 - R^2) = \text{SSR/SSE}$. If you have 25 cases and an $R^2 = 0.18$, what is the F statistic for the test that the slope is equal to zero?