STAT 2509 C
Assignment #2

DUE: February 3rd, 2015 (to be handed in during the class)

1. A study was conducted to examine the quality of fish after seven days in ice storage. Ten raw fish of the same kind and approximately the same size were caught and prepared for ice storage. Two of the fish were placed in storage immediately after being caught, two were placed in storage 3 hours after being caught, and two each were placed in storage at 6, 9 and 12 hours after being caught. Let *y* denote a measurement of fish quality (on a 10-point scale) after the seven days of storage and let *x* denote the time after being caught that the fish were placed in ice packing. The sample data are shown below:

y	8.5	8.4	7.9	8.1	7.8	7.6	7.3	7.0	6.8	6.7
x	0	0	3	3	6	6	9	9	12	12

$$\sum y_i = 76.1 \qquad \sum x_i = 60$$
$$\sum y_i^2 = 582.85 \qquad \sum x_i^2 = 540$$
$$\sum x_i y_i = 431.1$$

Parts (c) to (h) are to be done by hand and then the results verified by SAS in part (i):

Plot a scatter diagram (using SAS, see part (i)) to get an idea of the form of the relationship between the number of hours when fish were placed in ice storage after being caught and the fish quality. Does the scatter diagram indicate an approximately straight line?

(a) State a SLR model making sure you give all assumptions necessary for statistical inference.

(b) Find the least squares estimates of β_0 and β_1. Find the least squares fitted regression line.

For the rest of the question assume that the assumptions hold.

(c) Find s^2, an estimate of σ^2.

(d) Use the t-test to test whether there is a significant linear relationship between the number of hours when fish were placed in ice storage after being caught and the fish quality. Use $\alpha = 0.05$.

(e) Find a 95% confidence interval for β_1.

(f) Set up the ANOVA table and hence test whether there is a significant linear relationship between the number of hours when fish were placed in ice storage after being caught and the fish quality. Use $\alpha = 0.05$.

(g) Find the values of the coefficient of correlation, r, and coefficient of determination, r^2, and interpret their meanings in this problem.

(h) Verify your above results using SAS (Proc REG in SAS Manual or see the handout, SAS program (a)).

2. Refers to question 1.

(a) Find a 95% Confidence Interval for the mean value of the response variable (i.e. of the quality of fish) and a 95% Prediction Interval for an individual value of this response variable when the number of hours when fish were placed in ice storage after being caught is 4 (i.e. $x_p = 4$).

What is your conclusion about the widths of these two intervals?

(b) Use SAS to compare your results with part (a) (see handout, SAS program (c)).

3. Refers to question 1.

Perform a residual analysis using SAS (see handout, SAS program (b)). What can you say about the model?

Note: Remember to put a **FOOTNOTE** statement with your name and student number in the first line of your program.

Hand in both, your **program** and your **output**, with the appropriate measures **highlighted.**

Hand in only the **required** output when possible.