# STAT 516 - Spring 2001 - Homework 1
Due: Friday, February 2nd by noon  [previously 1/31/01]

1) *(2 points)*  Indicate whether each of the following is true or false.  If false, correct it so that it is a true statement.

a) A test of hypothesis results in a p-value of 0.06.  At $\alpha=0.05$, the null hypothesis would be rejected.

b) If a null hypothesis is rejected at $\alpha=0.05$, it would also be rejected at $\alpha=0.01$.

c) The p-value for testing $H_0$: $\mu=0$ vs. $H_A$: $\mu>0$ is found to be 0.025.  If we had used $H_A$: $\mu\neq0$, then the p-value would have been 0.975.

d) In order for the F-test for regression to be valid, the values of the dependent variable must be normally distributed.

2) *(2 points)*  Deviation Intelligence Quotient (DIQ) tests are generally scaled to have a mean of 100 and a standard deviations of 15.  A 1995 study in the *Journal of Communication Disorders* found that a group of 5-year old girls diagnosed as specifically language-impaired had the following scores: 86, 89, 84, 107, 87.  By both hand and SAS test $H_0$: $\mu=100$ vs. $H_A$: $\mu<100$ at $\alpha=0.05$.   Also, construct a 90% confidence interval for $\mu$.  (You may assume that the 5 girls selected are essentially a random sample.)

3) *(6 points)*  One of the earliest places that regression was discussed was in a paper entitled "Typical Laws of Heredity" that was delivered by Sir Francis Galton in 1877.  Galton categorized his sweet pea plants by the size of the seeds they produced (measuring the diameter in hundredths of an inch).  Using parent pea plants of seven different sizes, he arranged for 90 pea plants to be grown from each size (by forcing several friends to help).  Although several of the offspring didn't make it, he measured the average diameter of the peas for the plants that did survive.

| Diameter of Parent Peas | Mean Diameter of Offspring Peas |
|---|---|
| 21 | 17.26 |
| 20 | 17.07 |
| 19 | 16.37 |
| 18 | 16.40 |
| 17 | 16.13 |
| 16 | 16.17 |
| 15 | 15.98 |

Both by hand and SAS, calculate the estimated regression line, the MSE, and the ANOVA table for predicting the mean offspring diameter from that of the parent.  Interpret the estimated slope and the MSE.  Test $H_0$: $\beta_1=0$ vs. $H_A$: $\beta_1\neq0$ using $\alpha=0.05$.  Using SAS, check the assumptions for the regression you performed.