STAT 516 - Spring 2002 - Homework 1
Due: Thursday, January 24th

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 0.01. 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) A test of hypotheses results in a negative t-statistic and p-value of 0.05 for testing H_0: $\mu=0$ vs. H_A: $\mu\neq0$. If we had used H_A: $\mu<0$, then the p-value would have been 0.975.

d) In order for the regression assumptions to be met, the values of the independent 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 boys diagnosed as specifically language-impaired had the following scores: 86, 94, 98, 110, 95. 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 μ. Make sure to check the assumptions and comment on whether the test and confidence interval can be trusted. (You may assume that the 5 boys 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 several 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. A portion of this data was:

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

Both by hand and SAS, calculate the estimated regression line and $\sqrt{MSE}$ for predicting the mean offspring diameter from that of the parent. Interpret the estimated slope and the $\sqrt{MSE}$.