Homework 6.

(Due Oct. 13)

5.4.3 Consider a sequence of random variables X_i that are independently identically distributed with a positive state space. Explain why the central limit theorem implies that the random variable

$$X = X_1 \times \cdots \times X_n$$

has approximately a lognormal distribution for large values of n.

5.4.8 (a) There is a probability of 0.90 that a t random variable with 23 degrees of freedom lies between $-x$ and x. Find the value of x.

(b) There is a probability of 0.975 that a t random variable with 60 degrees of freedom is larger than y. Find the value of y.

(c) What is the probability that a chi-square random variable with 29 degrees of freedom takes a value between 19.768 and 42.557?

5.4.12 Use your computer package to find the following critical points:

(a) $\chi^2_{0.12,8}$

(b) $\chi^2_{0.54,19}$

(c) $\chi^2_{0.023,32}$

If the random variable X has a chi-square distribution with 12 degrees of freedom, use your computer package to find:

(d) $P(X \leq 13.3)$

(e) $P(9.6 \leq X \leq 15.3)$

6.2.3 **Piston Rod Lengths**
DS 6.2.3 shows the lengths of 30 piston rods. Construct a histogram of the data set with appropriate band widths. Do you think that there are any outliers in the data set?

6.2.4 **Physical Training Course Completion Times**
DS 6.2.4 shows the times taken by 25 students to finish a physical training course. Construct a histogram of the data set with appropriate band widths. Do you think that there are any outliers in the data set?

6.2.8 **Restaurant Service Times**
The data set of service times given in DS 6.1.4. Use a statistical software package to obtain appropriate graphical presentations of the data set. Obtain more than one graphical presentation where appropriate. Indicate any data observations that might be considered to be outliers. What do your pictures tell you about the data sets?

6.3.8 **Paving Slab Weights**
The data set of paving slab weights given in DS 6.1.7. Use a statistical software package to obtain sample statistics and boxplots for the data set. What do the sample statistics and boxplots tell you about the data set?

6.3.14 If a histogram is skewed with a long left tail, which of the following must be correct?

A. The sample mean is larger than the sample median.

B. The sample mean is smaller than the sample median

C. Some data points should be classified as outliers.