Homework Set # 1 problems

3.1. The content of liquid detergent bottles is being analyzed. Twelve bottles, randomly selected from the process, are measured, and the results are as follows (in fluid ounces): 16.05, 16.03, 16.02, 16.04, 16.05, 16.01, 16.02, 16.02, 16.03, 16.01, 16.00, 16.07

a. Calculate the sample average.
b. Calculate the sample standard deviation.

c. Construct Probability Plot by using a Normal Graph, Is the data normally distributed?

d. Use the probability plot to find the mean and the standard deviation.

3.20. The random variable x takes on the values 1, 2, or 3 with probabilities $(1 + 3k)/3$, $(1 + 2k)/3$, and $(0.5 + 5k)/3$, respectively.

a. Find the appropriate value of k.
b. Find the mean and variance of x.
c. Find the cumulative distribution function.

3.23. A random sample of 50 units is drawn from a production process every half hour. The fraction of nonconforming product manufactured is 0.02. What is the probability that $\hat{p} \leq 0.04$ if the fraction nonconforming really is 0.02?

3.25. Suppose that 10% of the adult population has blood chemistry parameters consistent with a diagnosis of a pre-diabetic condition. Of four volunteer participants in a health screening study, what is the probability that one of them is pre-diabetic?

b. What is the probability that more than one is pre-diabetic?

Additional problem:

Consider the following random variable:

f(0)= 0.10, f(1)=0.25, f(2)=0.30, f(3)=0.15, f(4)=0.1,f(5)=0.06, f(6)=0.04.

a) Find the mean and standard deviation of the random variable

b) Set up the CDF (Cumulative Distribution Function) for this random variable.

Extra Question for Honor and Graduate Students:

3.43. A production process operates with a constant 0.05% nonconforming output. Every 2 hours a random sample of 100 units is taken from this process and evaluated. If more than two nonconforming units are found in this sample, the process is stopped and quality engineering personnel search for the cause of excessive nonconforming production. What is the probability that a sample contains 2 or more nonconforming units? What do you think of this procedure? If this process operates with a constant 0.05% nonconforming rate of output for 8 hours each day, what is the probability that the process will be stopped over the next 2 weeks (10 days) when the percent nonconforming has not changed?