Homework Assignment Number Five

Problem 1. (6 points)

Given a standard normal distribution, find the area under the curve which lies

(a) to the left of z = 1.43

(b) to the right of z = -0.89

(c) between z = -2.16 and z = -0.65

Problem 2. (6 points)

The daily amount of coffee, in liters, dispensed by a machine located in an airport lobby is a random variable X having a continuous uniform distribution with A = 7 and B = 10. Find the probability that on a given day the amount of coffee dispensed by this machine will be

(a) at most 8.8 liters

(b) more than 7.4 liters but less than 9.5 liters

(c) at least 8.5 liters.

Problem 3. (4 points)

In the November 1990 issue of Chemical Engineering Progress a study discussed the percent purity of oxygen from a certain supplier. Assume that the mean was 99.61 with a standard deviation of 0.08. Assume that the distribution of percent purity was approximately normal.

(a) What percentage of product would you expect to be between 99.5 and 99.7?

(b) What purity value would you expect to exceed exactly 5% of the population?

Problem 4. (2 points)

The average life of a certain type of small motor is 10 years with a standard deviation of nine months. The manufacturer replaces all free all motors that fail while under guarantee. If he is willing to replace only 3% of the motors that fail, how long a guarantee should he offer? Assume that the lifetime of a motor follows the normal distribution.

Problem 5. (4 points)

You flip a coin 100 times.

(a) What is the probability that you obtain at least 40 heads? Use the binomial distribution.

(b) What is the probability that you obtain at least 40 heads? Use the normal approximation to the binomial distribution.

Problem 6. (6 points)

The life of a certain type of device has an advertised lifetime of 100 hours. The failure rate is constant and the exponential distribution applies.

(a) What is the mean time to failure?

(b) What is the probability that 200 hours will pass before a failure is observed?

(c) What is the probability that exactly 3 of 5 devices are functioning after 200 hours?

Problem 7. (4 points)

Using the gamma distribution with $\alpha = 4$ and $\beta = 1/3$, find

(a) $P(x < 1/2)$

(b) C where $P(x < C) = 0.05$

Problem 8. (4 points)

Using the Chi-Squared distribution with v=10, find

(a) $P(\chi^2 < 4)$

(b) C where $P(\chi^2 < C) = 0.05$

Problem 9. (4 points)

Using the t-distribution with v=10, find

(a) $P(t < -1)$

(b) C where $P(t < C) = 0.05$

Problem 10. (4 points)

Using the F-distribution with v_1=8 and v_2 = 12, find

(a) $P(F < 1)$

(b) C where $P(F < C) = 0.05$