KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
DHAHRAN, SAUDI ARABIA

STAT 319: Probability & Statistics for Engineers & Scientists

Semester 163, Quiz 3

Monday August 07, 2017

Name: ID #:

Q.No.1: - The manager of a gasoline station wants to study gasoline purchasing habits of motorists at his station. He selects a random sample of 60 motorists during a certain week, he found that the mean amount purchased was 11.3 gallons, with standard deviation 3.1 gallons.

a) Compute a 99% confidence interval estimate of the population mean purchased.

b) Interpret the interval of part (a).

Q.No.2: - Consider the stem-and-leaf display (with leaf unit = 1) shown here:

Stem	*Leaf*
2	0 3 7 8
3	1 3 5 5 6 8 9
4	0 2 2 3 4 4 7 8 9
5	2 3 6
6	1 4

(a) Describe the data shape.

(b) Find the sample mean.

(c) Locate the lower and upper quartiles.

Q.No.3: - The life in hours of a 75-watt light bulb is normally distributed with standard deviation 25 hours. A random sample of 20 bulbs has a mean life of 1014 hours.

(a) At the 5% significance level, is there evidence to support the claim that bulb life exceeds 1000 hours? Write down appropriate hypotheses; show the rejection region, the decision rule, and your conclusion.

(b) What is the p-value for the test?

(c) What is the smallest level of significance at which you would be willing to reject the null hypothesis?

Q.No.4: - A company manufactures tube light rods for household use. The length of the tube rods (in meters) is assumed to follow $N(\mu = 1, \sigma^2 = 0.01^2)$. Any manufactured tube rod is declared defective if its length is less than 0.98 m or greater than 1.02 m.

(a) If a random sample of size 10 rods is selected, what is the probability that the mean length is less than 1.01 meter?

(b) If a random sample of size 10 rods is selected, what is the probability of having at most 2 defective rods?