KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 133

STAT 319 Statistics for Engineers and Scientists

Third Exam Thursday August 7, 2014

Please circle your instructor name

Mr. Malik Mr. Al- Sawi Mr. Saleh

Name: _____ ID #:_____Section #____

Important Note:

- Show all your work including formulas, intermediate steps and final answer
- In hypothesis testing problems, write the null and the alternative hypotheses, test statistic, decision rule, critical values, and your conclusion, unless otherwise is specified.
- You may assume α = 0.05 for testing and 95% for confidence interval estimation if not otherwise stated.

Question No	Full Marks	Marks Obtained
1	15	
2	10	
3	10	
4	5	
Total	40	

Q1: A quality control engineer is interested in the mean length of sheet insulation being cut automatically by machine. The desired length of the insulation is 12 feet. It is known that the standard deviation in the cutting length is 0.15 feet. A sample of 70 cut sheets yields a mean length of 12.14 feet.

a. Obtain and interpret a 99% confidence interval for the mean length cut by machine. (7 pts)

b. Do you need any assumptions? If yes, what? If no, why? (2 pts)

c. Using the confidence interval, can we say the machine is working properly? Why? (3 pts)

d. Determine the sample size to estimate the population mean to be within ±01 with 99% confidence level. (3 pts)

Q2: Two machines M1 and M2 are used for filling plastic bottles with a net volume of 16 ounces. A member of quality engineering staff suspects that both machines fill to the same mean net volume. A random sample of 10 bottles is taken from the output of each machine and the following information was obtained

	M1	M2
Mean	16.015	16.005
Standard deviation	0.03027	0.02549

a. Do you think the engineer is correct? Use 2% level of significant (7 pts)

b. What is the probability value for this test? (3 pts)

Q3: A grinding machine will be qualified for a particular task if it can be shown to produce less than 8% defective parts. In a random sample of 300 parts, 12 were defective.

a. On the basis of these data, can the machine be qualified? (6 pts)

b. Discuss the effect of the size on the confidence interval estimate. (1 pt)

c. You want to estimate the proportion of the qualified particular task with 99% confidence with margin at most 5%. Find the minimum sample size necessary for this estimation. (3 pts)

Q4: In a manufacturing plant two machines are used to produce the same mechanical parts. A random sample of size 250 parts produced by machine I showed that 12 of the parts are nonconforming, whereas a random sample of size 400 parts produced by machine II showed 16 of the parts are nonconforming. Construct a 98% confidence interval of the difference in proportions of nonconforming parts produced by the two machines (5 pts)