KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 131

STAT 319 Statistics for Engineers and Scientists

Third Major Exam Monday December 9, 2013

Please check/circle your instructor's name

□ Abbasi □ Anabosi □ Jabbar □ Al-Sabah □ Saleh □ Alsawi

Name: _____ ID #: _____Section# _____

☺Important Notes:

- 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.

Question No	Full Marks	Marks Obtained
1	4	
2	5	
3	5	
4	6	
5	10	
Total	30	

1) An agricultural economist is interested in determining the average diameter of peaches produced by a particular tree. A random sample of $n = 25$ peaches is taken and the sample mean is calculated. Suppose that the mean diameter of peaches on this tree is known from previous years' production to be 60 mm with a standard deviation of 10 mm.
   a) What is the probability that the sample mean exceeds 65 millimeters? *(3 pts.)*

   b) What assumptions did you make, if any? *(1 pt.)*

2) It is claimed that an automobile in KSA is driven on the average more than 20,000 kilometers per year. To test this claim, a random sample of 100 automobile owners are asked to keep a record of the kilometers they travel. At the 5% significance level would you agree with this claim if the random sample showed an average of 21,000 kilometers and a standard deviation of 3900 kilometers? *(5 pts.)*

3) 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, 16 were defective. On the basis of these data, can the machine be qualified? Use the p-value approach and discuss all possible decisions. *(5 pts.)*

4) The production manager at a battery factory wants to determine whether there is any difference in the mean life expectancy of batteries manufactured on two different types of machines. A random sample of 21 batteries from machine 1 indicates a mean of 250 hours and a standard deviation of 75 hours, and a similar sample of 21 from machine 2 indicates a mean of 242 hours and a standard deviation of 90 hours. Using the 0.05 level of significance, and assuming that the population variances are equal, is there any evidence of a difference in the mean life of batteries produced by the two types of machines? *(6 pts.)*

5) In 9 soil specimens tested for trace elements, the average amount of copper was found to be 22 milligrams, with a standard deviation of 4 milligrams.

a) Find a 90% confidence interval for the true mean copper content in the soils from which these specimens were taken. *(3 pts.)*

b) What assumptions did you make, if any? *(1 pt.)*

c) Use the confidence interval to test the hypothesis that the mean is 26 mg at the 10% significance level. *(3 pts.)*

d) Find the p-value for testing the hypothesis in c). *(3 pts.)*