DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 132

STAT 319 Statistics for Engineers and Scientists

Third Major Exam Monday May 5, 2014

Please check/circle your instructor's name

□ Anabosi □ Jabbar □ Malik □ Al-Sabah □ Saleh

Name: _____ ID #: _____Section# _____

☺Important Notes:

- Show all your work including formulas, intermediate steps and final answer.
- In hypothesis testing problems, write the hypotheses, the test statistics, the rejection region, the decision and the conclusion.
- Unless otherwise specified, in testing problems use a significance level of 5%

Question No	Full Marks	Marks Obtained
1	8	
2	9	
3	7	
4	7	
5	9	
Total	40	

1) The life in hours of a battery has a standard deviation of 1.25 hours. A random sample of 20 batteries has a mean life of 40.5 hours.

   a) Is there evidence to support the claim that battery life is different from 40 hours? *(5 pts.)*

   b) Do you need any assumptions to carry out the test in a)? If yes, what? *(1 pt.)*

   c) What is the p-value for this test? *(2 pts.)*

2) Two suppliers manufacture a plastic gear used in a laser printer. The impact strength of these gears measured in foot-pounds is an important characteristic. A random sample of 10 gears from supplier 1 results in a mean = 290 and standard deviation = 12, while another random sample of 16 gears from the second supplier results in a mean = 321 and standard deviation = 22.

a) Do the data support the claim that the mean impact strength of gears from supplier 2 is at least 25 foot-pounds higher than that of supplier 1? Use $\alpha = 0.05$, and assume that both populations have equal variances. *(6 pts.)*

b) Do we need any other assumptions? If yes, what? *(1 pt.)*

c) What is the p-value for this test? *(2 pts.)*

3) Ten engineering schools in the United States were surveyed. The sample contained 250 electrical engineers, 80 being women; 175 chemical engineers, 40 being women.
   a) Compute a 90% confidence interval for the difference between the proportions of women in these two fields of engineering. *(3 pts.)*

   b) Interpret this interval. *(2 pts.)*

   c) Is there a significant difference between the two proportions? Explain. *(2 pts.)*

4) Two different types of injection – molding machines are used to form plastic parts. Two random samples, each of size 300, are selected, and 20 defective parts are found in the sample from first machine while 10 defective parts are found in the sample from the second machine
   a) Is it reasonable to conclude that both machines produce the same fraction of defective parts? *(7 pts.)*

5) In a study, of cylinder boring process for an engine block, specifications require that these bores be 3.5199 ± 0.0004 inches. Current practice is willing to tolerate up to 10% outside the specifications. Out of a random sample of 165, 36 were outside the specifications.

a) Do the data provide sufficient evidence to conclude that the true percentage of bores outside the specifications exceeds 16% at a 3% significance level? *(6 pts.)*

b) In case you erroneously concluded that the true percentage of bores outside the specifications exceeds 16%, what type of an error is this? Justify your answer. *(1 pt.)*

c) What is the probability of such an error? *(2 pts.)*