King Fahd University of Petroleum & Minerals

Mathematics & Statistics Department

STAT 319: Probability & Statistics for Engineers & Scientists

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Term 161

Third Major Exam

Wednesday 14/12/2016

5:30 – 7:00 PM

Please circle your instructor name:

Anabosi Al-Sawi Saleh Samuh

Std. Name: _____ Std. ID: _____ Serial No.: _____

Question No.	Full Mark	Marks Obtained
1.	16	
2.	14	
3.	8	
4.	7	
Total	**45**	

Q1]. . . [4+2+2+8 points] The manager of a paint supply store wants to estimate the actual amount of paint contained in 1-gallon cans purchased from a nationally known manufacturer. The manufacturer's specifications state that the standard deviation of the amount of paint is equal to 0.021 gallon. A random sample of 50 cans is selected and the sample mean amount of paint per 1-gallon can is 0.994 gallon.

1. Construct a 99% confidence interval estimate of the population mean amount of paint included in a 1-gallon can.

2. On the basis of these results, do you think the manager has a right to complain to the manufacturer that the average paint can does not contain a gallon of paint. Why?

3. Must you assume the population amount of paint per can is normally distributed? Explain.

4. By how much must the sample size n be increased if the length of the confidence interval in Part (1) above is to be halved?

Q2]. . . [2+3+4+2+2+1 points] A manufacturer of in-tank pumps claims that at most 30% of the pumps require repairs within the first five years of operation. If a random sample of 120 of these pumps includes 47 which required repairs within the first five years, and for testing that the true proportion of such pumps would exceed 0.3 at level of significance 0.043, answer the following:

1. State the hypotheses for this problem.

2. Compute the standard error of the sample proportion.

3. Compute the test statistic and the critical value of the test.

4. Perform the test and state your decision.

5. State any assumption necessary for the validity of the test.

6. What type of error you might have committed at your decision?

Q3]. . . [5+3 points] Two teams of workers assemble automobile engines at a manufacturing plant in Jubail. A random sample of 145 assemblies from team 1 shows 15 unacceptable assemblies. A similar random sample of 125 assemblies from team 2 shows 8 unacceptable assemblies.

1. Construct a 90% confidence interval for the difference between the proportions of unacceptable assemblies generated by the two teams.

2. Based on the confidence interval constructed in Part (1) above, is there sufficient evidence to conclude, at the 10% significance level, that the two teams differ with respect to their proportions of unacceptable assemblies?

Q4]. . . [7 points] A manufacturer claims that the average tensile strength of thread A differs from the average tensile strength of thread B. A sample of 30 pieces of type A thread and a sample of 25 pieces of type B thread were selected. A 95% confidence interval for the difference between the averages of the two threads is $(78, 88)$. Assume the population variances are equal.

1. Find the point estimate for the difference between the two averages of the two threads.

2. Find the estimated pooled standard deviation.

3. Construct a 93% confidence interval for the difference between the averages of the two threads.

GOOD LUCK