KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES
DHAHRAN, SAUDI ARABIA

STAT 212: BUSINESS STATISTICS II

Semester 133

First Major Exam

Wednesday June 25, 2014

4:00 – 5:30 pm

Name: ID #: Serial #:

Question No	Full Marks	Marks Obtained
1	**5**	
2	**5**	
3	**6**	
4	**6**	
5	**14**	
6	**7**	
7	**7**	
Total	**50**	

Note: For each question: Clearly state your hypotheses, assumptions and your conclusions. Use 5% level of significance unless specified other wise in the problem.

Q1. (5 Marks) Answer the following questions by indicating it is **T**rue or **F**alse

a. In hypothesis testing, the null hypothesis should contain the equality sign.

b. In testing a hypothesis, statements for the null and alternative hypotheses as well as the selection of the level of significance should precede the collection and examination of the data.

c. A one-tailed hypothesis for a population mean with a significance level equal to .05 will have a critical value equal to z = .45.

d. In a one-tailed hypothesis test, the larger the significance level, the greater the critical value will be.

e. When a hypothesis test is two-tailed, the level of significance must be twice as large as when the test is one-tailed.

Q2. (5 Marks) Answer the following questions by choosing the right answer.

1. When formulating a hypothesis test, which of the following statements is true?
   a. The null hypothesis should never contain the equality.
   b. The null and alternative hypotheses should be stated in terms of the population value.
   c. If possible, the research hypothesis should be formed as the null hypothesis.
   d. The null hypothesis should be established such that the chance of making a Type I error is minimized.
2. Which of the following would be an appropriate null hypothesis
   a. The mean of a population is equal to 55.
   b. The mean of a sample is equal to 55.
   c. The mean of a population is greater than 55.
   d. Only (a) and (c) are true.
3. If the *p* value is less than α in a two-tailed test,
   a. the null hypothesis should not be rejected.
   b. the null hypothesis should be rejected.
   c. a one-tailed test should be used.
   d. more information is needed to reach a conclusion about the null hypothesis.
4. The reason for using the t-distribution in a hypothesis test about the population mean is:
   a. the population standard deviation is unknown and the sample size is fairly small.
   b. it results in a lower probability of a Type I error occurring.
   c. it provides a smaller critical value than the standard normal distribution for a given sample size.
   d. None of the above would be a reason for using the t-distribution.
5. In a two-tailed hypothesis test for a population mean, an increase in the sample size will:
   a. have no effect on whether the null hypothesis is true or false.
   b. have no effect on the significance level for the test.
   c. result in a sampling distribution that has less variability.
   d. All of the above are true.

Q3. (6 Marks) A company that makes and markets a device that is aimed at helping people quit smoking claims that at least 70 percent of the people who have used the product have quit smoking. To test this, a random sample of n = 80 product users was selected and found out that only 60 quit smoking. Test this claim using 4% level of significance. Clearly state your hypotheses, critical value and conclusion.

H_0: H_1:

Assumption(s):

Test Statistic:

Critical Value =

Decision:

Conclusion:

Q4. (6 Marks) The director of the city Park and Recreation Department claims that the mean distance people travel to the city's greenbelt is about 5.0 km. Assume that the population standard deviation is known to be 1.8 km and the significance level to be used to test the hypothesis is 0.01 when a sample size of n = 36 people are surveyed, we found sample mean and sample standard deviation are 5.90 km and 1.5 respectively, based on this information can we reject the director claims? Explain.

H_0: H_1:

Assumption(s):

Test Statistic:

p-value =

Decision:

Conclusion:

Q5. (14 Marks) A processor wants to compare two food preservatives for their effects on retarding spoilage. Suppose 15 cuts of fresh meat are treated with preservative I and 15 are treated with preservative II, and the number of hours until spoilage begins is recorded for each of the 30 cuts of meat. The results are summarized in the table below.

Preservative I	Preservative II
$\bar{X}_I$ = 106.4 hours	$\bar{X}_{II}$ = 96.54 hours
S_I = 10.3 hours	S_{II} = 13.4 hours

a. What are you going to decide about the equality of the two population variances? Justify.

H_0: H_1:

Assumptions:

Test Statistic:

Critical Value =

Decision:

Conclusion:

b. Do you think that the first preservative has higher mean time than the second? Justify.

H_0: H_1:

Assumptions:

Test Statistic:

p-value =

Decision:

Conclusion:

Q6. (7 Marks) One criterion used to evaluate employees in the assembly section of a large factory is the defect rate (number of defective pieces per 1,000 parts produced). A defect rate is calculated for each worker in a yearly evaluation. The results for 100 workers are given in the table below.

		Years Since Training Period		
		< 1 Year	1 – 4 Years	5 – 9 Years
	High	**6**	**9**	**9**
Defect Rate	Average	**9**	**19**	**23**
	Low	**7**	**8**	**10**

Help the quality control department to find out whether there is a relationship between years of experience and defect rate at 1% level of significance.

H_0: H_1:

Assumptions:

Test Statistic:

Critical Value =

Decision:

Conclusion:

Q7. (7 Marks) The director of transportation of a large company is interested in the usage of the company's van pool program. She surveyed 129 of her employees on the usage of the program before and after a campaign to convince her employees to use the service and obtained the following:

		Before	
		Use	**Do Not Use**
After	**Use**	27	44
	Do Not Use	33	25

She will use this information to perform test using a level of significance of 0.05.

H_0: H_1:

Assumptions:

Test Statistic:

Critical Value =

Decision:

Conclusion: