



Prince Sultan University
Mathematics Department

STAT 271

Second Major Exam

Fall Term 162

Tuesday, Tuesday 25, 2017

Time Allowed: **90 minutes**

Student Name: _____

Student ID #: _____

Time:

Teacher's Name: Dr. Eric Benson

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 15 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1	20	
2	15	
3	20	
4	10	
5	15	
Total	80	/80 = %

1. A start-up cell phone application company is interested in determining whether household incomes are different for subscribers to eight different service providers. A random sample of 50 subscribers to each of the eight service providers was taken, and the annual household income for each subscriber was recorded. The partially completed ANOVA table is shown here:

ANOVA					
Source of Variation	df	SS	MS	F_o	F_{crit}
Between Groups	?	?	?	3.827	?
Within Groups	?	?	128.3		
Total	?	?			

- Fill in the ANOVA table with the missing values. **(10 points)**
- State the appropriate null and alternative hypothesis. **(3 points)**
- Based on the analysis of variance F-test, what conclusion should be reached regarding the null hypothesis? (Use $\alpha = 0.05$) **(7 points)**

15 points

2. A market researcher for an automobile dealer intends to conduct a nationwide survey concerning car repairs. Among the questions included in the survey is the following: "What was the cost of all repairs performed on your car last year?" In order to determine the sample size necessary, the researcher needs to provide an estimate of the standard deviation. Using past experience and judgment, he estimates that the standard deviation of the amount of repairs is \$200. Suppose that a small-scale study of 20 auto owners selected at random indicates a sample standard deviation of \$237.52.
- a. At the 0.05 level of significance, is there evidence that the population standard deviation is different from \$200? (5 points)
 - b. Estimate the p -value of this test and interpret its meaning. (5 points)
 - c. Find the 90% confidence interval for the population standard deviation of the repair cost. (5 points)

20 points

3. A study is conducted to determine if the percent of women who receive financial aid in undergraduate school is different from the percent of men who receive financial aid in undergraduate school. A random sample of undergraduates revealed these results.

	Women	Men
Sample size	250	300
Number receiving aid	200	180

- a. At $\alpha = 0.05$, is there significant to reject the null hypothesis of equal proportions? **(10 points)**
- b. Calculate the p -value for this test. **(5 points)**
- c. Find the 90% confidence interval of the difference in the population proportions **(5 points)**

10 points

4. A random sample of six music students played a short song, and the number of mistakes each student made was recorded. After they practiced the song 5 times, the number of mistakes each student made was recorded. The data are shown. At $\alpha = 0.05$, can it be concluded that there was a decrease in the mean number of mistakes?

Student	A	B	C	D	E	F
Before	10	6	8	8	13	8
After	4	2	2	7	8	9

15 points

5. **Calories in Ice Cream** The numbers of calories contained in $\frac{1}{2}$ -cup servings of randomly selected flavors of ice cream from two national brands are listed here. At $\alpha = 0.05$ level of significance, is there sufficient evidence to conclude that the variance in the number of calories differs between two brands?

Brand A		Brand B	
330	300	280	310
310	350	300	370
270	380	250	300
310	300	290	310