Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and General Sciences

COURSE DETAILS:

Statistics and Probability Theory	STAT 271	MAJOR II
Semester:	Spring Semester --Term 172	
Date:	April 18, 2018	
Time Allowed:	**90 minutes**	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section/Time	
Instructor's Name:	Dr. Eric Benson

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 2	Page 3	Page 4	Page 5	Page 6	Page 7	Total
Questions	**10**	**10**	**15**	**10**	**20**	**15**	**80**
Marks							

10 points

1. An experiment was run to determine whether four specific firing temperatures affect the density of a certain type of brick. The experiment led to the following data. Does the firing temperature affect the density of the bricks (are the means different)? Setup an ANOVA table Use $\alpha = .05$

Temperature (°F)			
100	125	150	175
	Density		
21.8	21.7	21.9	21.9
21.9	21.4	21.8	21.7
21.7	21.5	21.8	21.8
21.6	21.5	21.6	21.7
21.7	—	21.5	21.6
21.5	—	—	21.8
21.8	—	—	—

10 points

2. The standard deviation of the average waiting time to see a doctor for non-life threatening problems in the emergency room at an urban hospital is 32 minutes. At a second hospital, the standard deviation is 28 minutes. If a sample of 16 patients was used in the first case and 18 in the second case, is there enough evidence to conclude at the 0.05 significance level that the standard deviation of the waiting times in the first hospital is greater than the standard deviation of the waiting times in the second hospital?

15 points

3. Examine the sample obtained from a normally distributed population:

5.2	10.4	5.1	2.1	4.8	15.5	10.2
8.7	2.8	4.9	4.7	13.4	15.6	14.5

a. Conduct a hypothesis test to determine if the population variance is larger than 15.3. Use a significance level equal to 0.05. **(6 points)**

b. Estimate the p-value of this test. **(3 points)**

c. Calculate a 95% confidence interval for the population standard deviation. **(6 points)**

10 points

4. **College Degree Recipients** A survey of 800 recent degree recipients found that 155 received associate degrees; 450, bachelor degrees; 20, first professional degrees; 160, master degrees; and 15, doctorates. Is there sufficient evidence to conclude that at least one of the proportions differs from a report which stated that 23.3% were associate degrees; 51.1%, bachelor degrees; 3%, first professional degrees; 20.6%, master degrees; and 2%, doctorates? Use $\alpha = 0.05$.

20 points

5. **Weight Gain of Athletes** A researcher wishes to see whether there is any difference in the weight gains of athletes following one of three special diets. Athletes are randomly assigned to three groups and placed on the diet for 6 weeks. The weight gains (in pounds) are shown here. At a α=0.05, can the researcher conclude that there is a difference in the diets? Setup an ANOVA table.

Diet A	Diet B	Diet C
3	10	8
6	12	3
7	11	2
4	14	5
	8	
	6	

If the null hypothesis is rejected used the Fisher's LSD procedure $\left|\bar{x}_i - \bar{x}_j\right| \pm t_{\alpha/2}\sqrt{MSW\left(\frac{1}{n_i}+\frac{1}{n_j}\right)}$ to see which means differs, for our problem $t_{\alpha/2} = 2.2009$

15 points

6. **Weekend Furniture Sales** A large furniture retailer with stores in three cities had the following results from a special weekend sale. At $\alpha = 0.05$ is there sufficient evidence that the type of furniture sold was dependent upon the store?

	Recliner	Sofa	Loveseat
Store 22A	15	12	18
Store 22B	20	10	12
Store 22C	10	10	10