Prince Sultan University
STAT 271
Second Examination
Second Semester 2010/2011, Term 102
Tuesday, 17th May 2011
Dr. Mohammed Al-Haj Ebrahem

Time Allowed: 90 minutes

Maximum points: 20 points

Name: _____   _____   _____
       (First)   (Middle)   (Last)

ID Number: _____ **Serial Number**:_____ **Section:**_____

Important Instructions*:*

1. You may use CASIO scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You do NOT get special consideration if you forget your calculator.
4. Don't use notes or any notebook.
5. There should be NO talking during the examination.
6. Your exam will be taken immediately without any warning if your mobile is seen or heard.
7. You must show all your work beside the problem. Be organized.
8. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
9. This examination has **5** problems, with several parts. Make sure that your paper has all these problems

Problem	*Max points*	*Student's Points*
1	3	
2	3	
3	6	
4	4	
5	4	
Total	*20*	

Q1 (3 points total) A composition teacher wishes to see whether a new program will reduce the number of grammatical errors his students make when writing a two-page essay. The results are given in the following table.

Student	1	2	3	4	5	6
Errors before	12	9	0	5	4	3
Errors after	9	6	1	3	2	3

(***Note*** : $S_D^2 = 2.7$)

1. ***(2 points)*** At $\alpha = 0.05$, can it be concluded that the number of errors has been reduced?

2. ***(1 point)*** Construct a 95% confidence interval for μ_D.

Q2 (3 points total) Independent random samples from two normal populations with variances σ_1^2 and σ_2^2 respectively produced the following summary of the data:
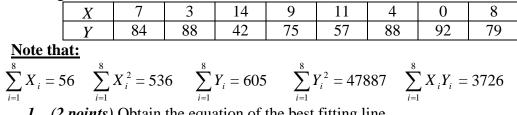
	Population 1	**Population 2**
Sample size	21	16
Sample Variance	100	40

1. ***(2 points)*** At $\alpha = 0.05$, test H$_0$: $\sigma_1^2 = \sigma_2^2$ vs. H$_1$: $\sigma_1^2 \neq \sigma_2^2$.

2. ***(1 point)*** Calculate the P-value.

Q3 (6 points total)

A random sample of 8 students is selected to study the relationship between the number of absences (X) and the final grade (Y) in a certain course. The data are given in the following table:

X	7	3	14	9	11	4	0	8
Y	84	88	42	75	57	88	92	79

Note that:

$$\sum_{i=1}^{8} X_i = 56 \quad \sum_{i=1}^{8} X_i^2 = 536 \quad \sum_{i=1}^{8} Y_i = 605 \quad \sum_{i=1}^{8} Y_i^2 = 47887 \quad \sum_{i=1}^{8} X_i Y_i = 3726$$

1. **(2 points)** Obtain the equation of the best fitting line.

2. **(2 points)** Construct a 90% prediction interval for final grade if the number of absence is 10.

3. **(2 points)** Test at $\alpha = 0.05$, $H_0 : \rho = 0$ vs $H_1 : \rho \neq 0$.

Q4 (4 Points total) Two groups of students are given a problem solving test, and the results are compared. The following table gives summary of the results:

	Mathematics majors	Statistics majors
Sample size	15	12
Sample mean	83.5	79.5
Sample standard deviation	4.3	3.8

1. ***(2 points)*** At $\alpha = 0.1$, test if the data provide sufficient evidence to indicate a difference between the mean for the two groups of students. Assume that the populations being sampled are independently normally distributed.

2. ***(2 points)*** Construct a 90% confidence interval for the differences in the two means.

Q5 (4 points total) In a sample of 80 Americans, 55% wished that they were rich. In a sample of 90 Europeans, 45% wished they were rich.

1. ***(2 points)*** At $\alpha = 0.01$, is there a difference in the proportions of Americans and Europeans.

2. ***(2 points)*** Construct a 99% confidence interval for the difference of the two proportions.

Good Luck