Prince Sultan University
STAT 271
Second Examination
First Semester 2010/2011, Term 101
Wednesday, 29th December 2010
Dr. Mohammed Al-Haj Ebrahem

Time Allowed: 90 minutes

Maximum points: 50 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 **7** problems, some with several parts. Make sure that your paper has all these problems

Problem	Max points	Student's Points
1	7	
2	16	
3	5	
4	6	
5	5	
6	6	
7	5	
Total	50	

Q1. (7 Points total)The length of time to recovery was recorded for patients randomly assigned and subjected to two surgical procedures X and Y. The following table gives summary of the data (recorded in days):

Procedure	**X**	**Y**
Sample size	13	11
Sample mean	10.4	8.2
Sample variance	1.5	1.2

1. ***(3 point)*** At $\alpha = 0.05$, test if the data provide sufficient evidence to indicate a difference between the mean recovery times for the two surgical procedures X and Y. Assume that the populations being sampled are independently normally distributed.

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

3. ***(2 point)*** Construct a 90% confidence interval for $(\mu_1 - \mu_2)$, where μ_1 is the population mean for procedure X, and μ_2 is the population mean for procedure Y.

Q2 (16 points total) To study the relationship between the number of years of experience(X) and the annual salary in thousands of dollars (Y). Consider the following data.

X	1	2	15	11	15	9	6
Y	33	37	61	57	60	45	42

Note that:

$\sum_{i=1}^{7} X_i = 59$ $\sum_{i=1}^{7} X_i^2 = 693$ $\sum_{i=1}^{7} Y_i = 335$ $\sum_{i=1}^{7} Y_i^2 = 16817$ $\sum_{i=1}^{7} X_i Y_i = 3206$

1. ***(3 point)*** Calculate S_{XX}, S_{YY} and S_{XY}.

2. ***(2 point)*** Obtain the equation of the best fitting.

3. ***(4 point)*** Construct a 95% prediction interval for the annual salary corresponding to 10 years of experience.

4. ***(2 point)*** Calculate the correlation coefficient. Comment.

5. ***(3 point)*** Test at $\alpha = 0.05$, $H_0 : \rho = 0$ vs $H_1 : \rho \neq 0$.

6. ***(2 point)*** Calculate the coefficient of determination. Comment.

Q3 (5 points) Given that the regression line equation is: $Y' = 3 + 4X$.
Let $n = 10$, $r = 0.8$ and $S_{XX} = 30$.
Calculate the value of error sum of square.

Q4 (6 points total) A student believes that a 1-hour review session can improve the grades on a certain mathematics exam. To test this claim, the students are given the test and their grades are recorded. Then the same students attend the review session and set for another equivalent exam and their grade are recorded. The results are given in the following table.

Student	1	2	3	4	5	6
Grades before	22	26	17	20	28	31
Grades after	21	29	15	20	26	32

(***Note*** **:** $S_D = 1.941$ **)**

1. ***(3 point)*** Test at $\alpha = 0.05$, whether the review session improves the student grades.

2. ***(3 point)*** Construct a 95% confidence interval for μ_D.

Q5 (5 points total) A researcher wants to compare the variances of the heights of four-year college basketball players with those of players in junior colleges. A sample of 31 players from each type of school is selected, and the variances of the heights for each type are 2.41 and 3.15, respectively.

1. ***(3 point)*** At $\alpha = 0.05$, is there a significant difference between the variances of the heights?

2. ***(2 points)*** Calculate the P-value.

Q6 (6 points total) A survey found that 87% of the men questioned preferred computer assisted instruction to lecture and 75% of the women preferred computer assisted instruction to lecture. There were 100 individuals in each sample.

1. ***(3 point)*** At $\alpha = 0.05$, test the claim that there is no difference in the proportion of men and women who favor computer assisted instruction over lecture.

2. ***(3 point)*** Construct a 95% confidence interval for the difference of the two proportions.

Q7 (5 points) Two brands of batteries are tested, and their voltage is compared. The data follow.

Brand	**X**	**Y**
Sample size	27	30
Sample mean	9.2	8.8
Population standard deviation	0.3	0.1

1. ***(3 point)*** At $\alpha = 0.05$, is there sufficient evidence to conclude that the mean of brand X is greater than the mean of brand Y. Assume that the populations are independently normally distributed.

2. ***(2 point)*** Construct a 95% confidence interval for the differences in the two means.

Good Luck