**Prince Sultan University**
**STAT 271**
**Second Examination**
**First Semester 2011/2012, Term 111**
**Wednesday, 30th November 2011**
***Dr. Bahaa El-din Abdalla***

## Time Allowed: 90 minutes

***Maximum points: 30 points***

**Name: _____ _____ _____ ID Number: _____**

(First) (Middle) (Last)

## 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 |
|---|---|---|
| 1,2 | 8 | |
| 3,4 | 10 | |
| 5,6 | 8 | |
| 7 | 4 | |
| Total | **30** | |

***Q1 (4 points)*** A sample of 12 chemists from Washington state shows an average salary of $39420 with a standard deviation of $1659, while a sample of 26 chemists from New Mexico has an average salary of $30215 with a standard deviation of $4116. Is there a significant difference between the two states in chemists' salaries at $\alpha = 0.02$?

***Q2 (4 point)*** In a sample of 80 workers from a factory in city A, it was found that 5% were unable to read, while in a sample of 50 workers in city B, 8% were unable to read. Find the 90% confidence interval for the difference of the two proportions. Use the confidence interval to determine whether there is a significance difference between the two proportions or not.

***Q3 (8 points)*** A study is conducted to determine the relationship between a driver's age and the number of accidents he or she has over a 1-year period. The data are shown here.

| Driver's age $x$ | 16 | 24 | 18 | 17 | 23 | 27 | 32 |
|---|---|---|---|---|---|---|---|
| No. of accidents $y$ | 3 | 2 | 5 | 2 | 0 | 1 | 1 |

1. ***(1 point)*** Draw the scatter plot.

2. ***(2 points)*** Find and interpret the coefficient of determination.

3. ***(4 points)*** Test the significance of the correlation coefficient at $\alpha = 0.1$.

4. ***(1 point)*** Predict the number of accidents of a driver who is 28.

***Q4 (2 points)*** Using the $F$ distribution table, find the $P$-value for the following $F$ test value:

$F = 3.85$, d.f.N. = 8, d.f.D. = 10, two tailed.

***Q5 (5 points)*** In an effort to improve the mathematical skills of 10 students, a teacher provides a weekly 1-hour tutoring session for the students. A pretest is given before the sessions, and a posttest is given after. The results are shown here. At $\alpha = 0.01,$ can it be concluded that the sessions help to improve the students' mathematical skills?

| Student | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Pretest | 82 | 76 | 91 | 62 | 81 | 67 | 71 | 69 | 80 | 85 |
| Posttest | 88 | 80 | 98 | 80 | 80 | 73 | 74 | 78 | 85 | 93 |

***Q6 (3 points)*** A researcher collects the following data and determines that there is a significant relationship between the age of a copy machine and its monthly maintenance cost. The regression equation is $y' = 60.04 + 6.09x.$ Find the standard error of the estimate.

| Machine | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Age *x* (years) | 1 | 2 | 3 | 4 | 4 | 6 |
| Monthly cost *y* | 65 | 75 | 79 | 80 | 85 | 98 |

***Q7 (4 points)*** A politician wishes to compare the variances of the amount of money spent for road repair in two different counties. The data are given here.

| **County A** | **County B** |
|---|---|
| $s_1 = \$11596$ | $s_2 = \$14837$ |
| $n_1 = 15$ | $n_2 = 15$ |

At $\alpha = 0.05$, is there a significant difference in the variances of the amount spent in the two counties?

***Q8 (2 points extra)***

***(a)*** Find $\bar{p}$ and $\bar{q}$ for the following. Do not round your answer.

$$\hat{p}_1 = 0.15,\ n_1 = 90,\ \hat{p}_2 = 0.1,\ \text{and } n_2 = 35.$$

***(b)*** What is the range of values for the correlation coefficient?