PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
Second Mid -Term Examination (082)
Second Semester (2008-2009)
STAT 271

Student name			
Student ID		Section No.	
Name of Teacher	Dr. Quazi Abdus Samad		

Time allowed: **90 Minutes**
Write down your answer in the space provided underneath the question.
Numbers are given in the brackets.
You may use a programmable calculator and/or the formula sheet.

$Z_{0.10}$	$Z_{0.05}$	$Z_{0.025}$	$\mathbf{Z_{0.01}}$	$Z_{0.005}$
1.285	1.645	1.96	2.325	2.575

Important instruction: You are required to state clearly the null and alternative hypotheses in all problems, compute the value of the test statistics, compare the calculated and tabulated value(s) of the test statistics concerned and state your conclusions. Any deficiency in this respect will lead to deduction of marks.

Question 1. [10] A faculty advisor was interested in determining whether there is a difference in the amount of time (in hours) spent studying on weeknights (Monday through Thursday) between male and female students. The advisor selected a sample of 12 female students and a second independent sample of 10 male students and asked each student to indicate the average amount of time they spend studying on a weeknight. The following summary statistics are obtained.

	Female	Male
Sample Size	12	10
Sample Mean	3.267	3.390
Sample Variance	0.749	0.837

a. State the null and alternative hypotheses for the advisor.

b. Perform the appropriate test of hypothesis to determine whether there is a significant difference in average time spent studying on weeknights between male and female students. Use pooled estimate of variance. Test using $\alpha = 0.05$.

c. Using the critical value or the p-value approach and $\alpha = 0.10$, what conclusion can be drawn about the difference in average time spent studying on weeknights between male and female students?

Question 2 (10 points) a. Develop a 95% confidence interval for the average amount of time spent studying on weeknights by females (from question 1).

b. Develop a 95% confidence interval for the difference of the two sample averages of time spent studying on weeknights by males and females (from question 1).

c.Do the results of question 1b and question 2b lead you to the same results? **Why or why not**?

Question 3 [10 points] A firm's product can be wrapped in any of three colors red, white, and blue. The manager wants to test whether mean monthly sales (in $1000) are the same, regardless of the color. Viewing the past five months as a random sample, the manager collected the data shown below.

Sales history (thousands of dollar)

	Wrapping		
Observation	**Red**	**White**	**Blue**
March	20	20	27
April	21	22	18
May	22	26	22
June	23	31	23
July	24	18	27

a. State the null and alternative hypotheses.

b. Create the appropriate, detailed ANOVA table.

c. Perform the test at the 1% level of significance and state your conclusions.

d. Determine whether there is any difference in mean monthly sales of the product using white and blue wrapping (use the 99% confidence interval).

Question 4 [10] The manager of an ice cream store is interested in examining the relationship between sales of ice cream (in gallons per day) and maximum temperature of the day. The vendor records the following data for a random sample of five days in the summer, where *y* is number of gallons of ice cream sold per day and *x* is maximum temperature, in degrees Fahrenheit, recorded for the day:

x	85	90	95	87	80
y	5	7.5	10	6	4.3

a. Find the least-squares regression line.

b. Find and interpret the coefficient of determination.

c. Test H_0: $\beta = 0$ vs. H_a: $\beta \neq 0$ at the 0.05 level of significance (Use t-test or F-test).