PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
Second Mid -Term Examination (081)
First 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] Independent random samples of 46 and 60 observations are drawn from two quantitative populations, 1 and 2, respectively. The sample data summary is shown here:

	Sample 1	Sample 2
Sample Size	46	60
Sample Mean	1.58	1.70
Sample Variance	0.118	0.156

a. Find the value of the test statistic to test whether the data provide sufficient evidence that the mean for population 1 is smaller than the mean for population 2.

b. State the null and alternative hypotheses.
c. Use the p-value approach for your conclusion (Use a = 0.05)

d. Use the critical value approach for your conclusion (Use a = 0.05)

Question 2. [10] Independent random samples of n_1 = 150 and n_2 = 150 sales phone calls for an insurance policy were randomly selected from binomial populations 1 and 2, respectively. Sample 1 had 80 successful sales, and sample 2 had 88 successful sales. Suppose you have no preconceived theory concerning which parameter, p_1 or p_2 is the larger and you wish to detect only a difference between the two parameters if one exists.

a. What should you choose as the null and alternative hypotheses for a statistical test?

b. Calculate the standard error of the difference in the two sample proportions, (p_1 and p_2). Make sure to use the pooled estimate for the common value of p.

c. Calculate the test statistic that you would use for the test.

d. Do the data provide sufficient evidence to indicate a difference in the population proportions at the 1% level of significance? (Use the critical value approach for your conclusion).

Question 3. [10] A drapery store manager was interested in determining whether a new employee can install vertical blinds faster than an employee who has been with the company for two years. The manager takes independent samples of 10 vertical blind installations of each of the two employees and computes the following information:

	New employee	Veteran employee
Sample size	10	10
Sample mean	22.5	25
Standard deviation	0.95	0.80

a. State the appropriate null and alternative hypotheses to test whether the new employee installs vertical blinds faster, on the average, than the veteran employee.

b. Calculate the value of the test statistic (use the pooled estimate of the common variance).

c. Set up the appropriate rejection region for the hypotheses assuming a = 0.05.

d. What is the appropriate conclusion?

e. Find a 95% confidence interval for the difference (μ_1 - μ_2) and interpret the result.

Question 4. [10] An automobile parts store was interested in comparing the mean life length of three brands of automobile brake shoes. The following data represents the life length, measured in 1,000's of miles, of random samples of six sets of brake shoes of each brand:

	Brakes 1	Brakes 2	Brakes 3
	43	51	34
	44	65	45
	57	62	39
	41	67	37
	47	58	48
	54		38
Totals	**286**	**303**	**241**

a. State the null and alternative hypotheses to test whether there is a significant difference in mean life length among the three brands of brake shoes. Use a = 0.05.

b. Construct the ANOVA table including the F-test.

c. What is the critical region for the test?

d. What is your conclusion on the basis of the F-test?

e. Test whether there is any difference between the mean life length of brakes 1 and brakes 2. Comment on the result.