



PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
Second Mid-Term Examination
Second Semester 2007–2008 (072)
STAT 271

Student Name:			Mark <hr style="width: 50px; margin: 0 auto;"/> 20
Student Number:		Section Number:	
Teacher Name:		Attendance Number:	

- Time allowed is 1½ hours.
- Write down your answer in the space provided underneath the question.
- You may use a programmable calculator and/or your formula sheet.
- Use $\alpha = 0.05$ if it was not specified in the question.

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

Question 1:

To test the claim that the consumption of red meat has decreased over the last 10 years, a researcher decides to select hospital nutrition records for 400 subjects surveyed 10 years ago and to compare their average amount of beef consumed per year to amounts consumed by 400 subjects interviewed this year. The data are given in the following table:

	1 st Sample (10 years ago)	2 nd Sample (this year)
Sample size (n)	400	400
Sample mean (\bar{X})	73	70
Sample variance (S^2)	25	28

Do these data present sufficient evidence to indicate that the beef consumption has decreased in the last 10 years? Use $\alpha=0.01$. (Your discussion should include: (1) the null and the alternative hypotheses, (2) the value of the test statistic, (3) the rejection region, and (4) your conclusion.)

Hint: The researcher hypothesis is that $\mu_1 > \mu_2$.

Question 2:

A researcher wants to compare the proportions of defective items in two factories A and B . Suppose that p_1 is the proportion of defectives in the first factory A , and p_2 is the proportion of defectives in the second factory B . The researcher independently selected a random sample of 200 items from each factory and found the following results:

	1 st Sample (10 years ago)	2 nd Sample (this year)
Sample size (n)	200	200
Number of defective items (X)	25	15

Do these data present sufficient evidence to indicate a difference between the proportions of defectives? Use $\alpha=0.05$. (Your discussion should include: (1) the null and the alternative hypotheses, (2) the value of the test statistic, (3) the rejection region, and (4) your conclusion.)

Hint: The researcher hypothesis is that $p_1 \neq p_2$.

Question 3:

A new tourism package can be operated at a profitable level only if the average number of people participated is greater than 20. To evaluate the profitability of this project, 5 packages have been selected independently from the records of the tourism agency and found that the number of people participated in these packages are: 25, 18, 24, 20, 28.

(a) Do these data present sufficient evidence to indicate that the project is profitable? In other words, do these data present sufficient evidence to indicate that the average (mean) number of people participated in the project is in excess of 20 people? Use $\alpha = 0.01$.

Hint: The researcher hypothesis is that $\mu > 20$. Data summary: $\sum x_i = 115$, $\sum x_i^2 = 2709$.

(b) Construct a 99% confidence interval for μ (mean number of people participated in the project.)

Question 4:

Sixteen students were randomly separated into four equal groups, and each group was taught a mathematical concept using a different teaching method. At the end of the teaching period, progress was measured by a unit test. The scores are shown below:

	Group 1	Group 2	Group 3	Group 4	Total
Observations	92	129	140	116	
	124	102	121	105	
	89	136	130	126	
	97	99	106	119	
n_i	4	4	4	4	$n = 16$
Sum= $T_i = \sum_{i=1}^{n_i} x_i$	402	466	497	466	$G = \sum \sum_{i=1}^{n_i} x_i = 1831$
Sum of squares= $\sum_{i=1}^{n_i} x_i^2$	41170	55342	62377	54518	$\sum \sum_{i=1}^{n_i} x_i^2 = 213407$

(a) Construct ANOVA Table.

(b) Do the data present sufficient evidence to indicate a difference in the average scores for the four teaching method? Use $\alpha = 0.05$.

Hint: $H_o : \mu_1 = \mu_2 = \mu_3 = \mu_4$.