

PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
First 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.

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

Question 1: Suppose a random sample of $n = 29$ measurements are selected from a population that is normally distributed, with mean equal to 109 and standard deviation equal to 14.

- a. What is the mean of $\bar{X}$?
(1)

- b. What is the standard deviation of the sample mean $\bar{X}$?
(1)

- c. Find the probability that $\bar{X}$ exceeds 112.
(1)

- d. Find the probability that the sample mean deviates from the population mean $\mu = 108$ by no more than 5. (1)

Question 2: Suppose that 66% of the students used internet as their major resource for their college project. If a sample of $n = 750$ students who used internet is chosen and if the proportion of the internet users is $\hat{p}$, then find:

- a. The mean and standard error of $\hat{p}$. (1)
- b. What is the probability that the sample proportion $\hat{p}$ exceeds 0.70 ? (1)
- c. What is the probability that the sample proportion lies between 64% and 68% ? (2)

Question 3: Suppose the average nightly room rates and the associated standard deviations of hotel Sheraton and hotel Radisson are known as follows:

Hotels	Sheraton	Radisson
Sample average	185	160
Sample standard deviation	18.5	16.5
Sample size	50	50

- a. Find the point estimate of $(\mu_1 - \mu_2)$. (1)

b. Find the 99% margin of error of $(\mu_1 - \mu_2)$. (1)

c. Find a 99% confidence interval for the population mean difference $(\mu_1 - \mu_2)$. (1)

d. Interpret the 99% confidence interval that you have obtained in part c. (1)

Question 4: Suppose a random sample of $n = 450$ observations from a binomial population produced $x = 390$ successes.

a. Find a point estimate for the population proportion (p) and denote it by $\hat{p}$. (1)

b. Find a 95% margin of error of estimating p by $\hat{p}$. (2)

c. Find a 95% confidence interval for the population proportion (p). (2)

- d. How would you interpret the 95% confidence interval that you obtained in part c(1)

Question 5: Suppose you wish to estimate a population mean based on a random sample of n observations, and prior knowledge suggests that $\sigma = 15.8$. If you wish to estimate μ correct to within 2.7, with probability equal to 0.99, what will be the sample size? (2)