PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
First Mid -Term Examination (082)
Spring Semester 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

Question 1 (10 points): Suppose that college faculty with the rank of professor earn an average of $66605 per year with a standard deviation of $4100. To verify this salary level a random sample of 55 professors was selected from a personnel database in the United States.

a. Calculate the probability that the sample mean x is greater than $68500.

b. Find the probability that the sample mean deviates from the population mean μ = $66605 by no more than $1000.

Question 2: (10 points) Random samples of size n = 450 were selected from a binomial proportion with p = .44.

a. Find the probability that p will lie between 0.40 and 0.50

b. Find the probability that p lies within 0.06 of p.

Question 3: (8 points) a. Calculate the width of a 95% confidence interval for μ using σ = 11 and n = 255.

b. Calculate the 99% confidence interval for the population mean μ with x = 510, σ = 11 and n = 255.

Question 4: (5 points) a. A random sample of n =956 observations from a binomial population produced x = 659 successes.

a. Calculate the 99% confidence interval for the binomial proportion p and interpret the result.

Question 5: (10 points) A parent believes the average height for 14 year old girls differs from that of 14 year old boys. Estimate the difference in the height between girls and boys using a 95% confidence interval. The summary data are listed below where height is in feet. Based on your interval, do you think there is a significant difference between the true mean height of 14 year old girls and boys? Explain.

$n_1 = 40$, $x_1 = 5.1$, $S_1 = 0.2$, $n_2 = 40$, $x_2 = 4.8$, and $s_2 = 0.3$.

Question 6: (10 points) A quality control engineer wants to determine what proportion of defective parts are coming off the assembly line. Past experiments based on large sample sizes show this proportion to be 0.19. What sample size does the engineer need in order to estimate this proportion with a margin of error of 0.12 with 90% confidence?

Question 7: (7 points) A drug manufacturer claimed that the mean potency of one of its antibiotics was 80%. A random sample of n =100 capsule were tested and produced a sample mean of 79.7% with a standard deviation of s = 0.8%. Do the data present sufficient evidence to disprove the manufacturers claim? Use $\alpha = 0.05$.

a. State the null and alternative hypotheses

b. Conduct a statistical test and state your conclusion.