Time: 2 hours 6/2/02

MATH 207
First Semester,01-02
FINAL EXAM

Instructions: 1) Show your work in all the problems. Justify your answers.
2) Give answers correct to 2 decimal places.

1.A normally distributed sample of3000 observations has a mean $\overline{x} = 82$ and a standard deviation $s = 16$. Find the approximate number of observations that fall in the intervals $\overline{x} \pm 1s$, $\overline{x} \pm 2s$ and $\overline{x} \pm 3s$.

2. At a city high school, past records indicate that the MSAT scores of students have a mean of 510 and a standard deviation of 90. One hundred students in the high school are to take the test. What is the probability that their mean score will be

(a) Less than 500?
(b) Between 485 and 520?

3. Below is an ordered stem-and-leaf plot of the monthly salaries of 20 employees in a company. Salaries are in hundreds of dollars (Example:4/3 = $4300)

4	3 6
5	0 2 4 5 8
6	1 4 5 8 7 9
7	1 1 2 5
8	0 1
9	7

(a) Calculate the mean and the median for these 20 salaries.
(b) What type of distribution do these salaries have: symmetric, left-skewed, or right-skewed? Give a clear reason for your answer.

4. Suppose that you plan to apply the one-sample z-interval procedure to obtain a confidence interval for a population mean. You know that $\sigma = 10$ and that you are going to use a sample of size 36.

(a) At the 95% confidence level, what will be your margin of error?
(b) At the 98% confidence level, what will be your margin of error?
(c) What relationship exists between the precision of the estimate and the level of confidence? Explain.

5.A company was working on a new liquid diet and an official wanted to estimate the mean weight loss μ for people on the diet. Assume $\sigma = 3$lb. How large a random sample is required to estimate μ to within 0.5lb with 90% confidence?

6. To estimate the average amount μ, paid by Canadian families in taxes, a sample of 500 families was used. For this sample, the mean amount paid in taxes per family was $\overline{x}$ =\$28,127. Construct a 90% confidence interval for the population mean. Use σ = \$8100.

7. The president of a university claims that the mean time per week spent partying by all the students at this university is less than 9 hours, which is the general average of partying time per week for all university students of that city. A random sample of 20 students taken from this university showed that they spent an average of 8 hours partying, with a standard deviation of 2.3 hours. Assume that the times spent partying by all students at this university are normally distributed. Perform a hypothesis test to check the president's claim.

(a) Suppose that the probability of making Type I error is selected to be zero. What is your conclusion in this case?

(b) Using the 2.5% significance level, can you conclude that the president's claim is true?

8. A typing instructor wondered whether a new method of instruction would result in a change in the mean typing speed of students. The old method produced a mean of 64 words per minute. The results of 38 students using the new method were $\overline{x}$ = 60 w.p.m. with a standard deviation s =13 w.p.m.

(a) At the 5% significance level, can the instructor conclude that the new mean is different from 64?

(b) What type of error may have been committed?