STA 2215
Second Test
Spring 2003
Prof. Olsh

Show all calculations.

1. To win the Michigan Lotto a person must correctly pick 6 distinct numbers from the numbers 1 through 46. A lotto ticket costs $1. If you buy 1000 tickets (and choose different sets of six numbers for each ticket, of course), what is the probability that you will have the winning set of numbers?

2. For a certain bank 20% of its loans result in a loss of $100 dollars, 60% of its loans result in a profit of $50, while the bank breaks even ($0 loss or profit) on the remaining loans. What is the expected profit from a loan customer of this bank?

3. If 5 of a company's 15 delivery trucks do not meet emission standards and 4 of them are randomly chosen for inspection, what is the probability that all of them will meet emission standards?

4. If P(G) = 0.50, P(H) = 0.24, and P(G $\cup$ H) = 0.62, are events G and H dependent or independent?

5. The mean speed of a passenger car on Interstate 94 is ì equals 73 mph with a standard deviation, ó, of 5. What is the minimum probability that the next time we point our radar gun at a passenger car driving along Interstate 94 the car we target will be going between 58 and 88 mph? [Hint: This problem does **not** assume a normal distribution.]

6. A traffic study has shown that at a certain intersection 15% of all vehicle going through the intersection run the stop sign. In a typical day in which 1000 cars go through this intersection, what is the probability that more than 175 will run the stop sign?

7. A consumer watchdog group wants to estimate the true mean weight of a 5 oz. candy bar. From past candy bar studies they know that the standard deviation for the weight of a candy bar is $\sigma = .01$ oz. What sample size is necessary in order for this group to assert with 95% confidence that its estimate of the mean weight of this candy bar is within .005 oz. of the true mean weight?

8. A popcorn lover wants to estimate the mean weight of a bag of microwave popcorn after it is popped. He wants to have 99% confidence interval. He takes a sample of size 36 bags and weighs each one after it has been popped. The sample yields mean of 12 oz. and a standard deviation of .3 oz. What is his confidence interval?

9. In order to determine whether a new diet actually helps overweight people loose weight, a clinic randomly chooses 10 overweight people. Each person is weighed before going on the new diet. After 6 months on the diet, each person is weighed again. The results are below:

person	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Before	300	310	280	290	320	295	330	305	298	304
After	250	312	230	275	305	300	280	150	310	285

Test at the 0.05 level, if the conclusion is warranted, that the diet is effective in reducing weight. Note that the mean and standard deviation of the differences are 33.5 and 48.63, respectively.

10. I randomly selected the scores of three graduates from each of four golf schools. The novice golfers' scores were for nine holes at Augusta National.

Nicklaus School (N)	:	60, 61, 56
Palmer School (P)	:	59, 52, 51
Leadbetter School (L)	:	55, 55, 52
Harmon School (H)	:	58, 58, 55

$\overline{X}_N = 59,\ \overline{X}_P = 54,\ \overline{X}_L = 54,\ \overline{X}_H = 57$

$S_N^2 = 7,\quad S_P^2 = 19,\quad S_L^2 = 3,\quad S_H^2 = 3$

Test at the 0.01 level of significance the claim that the observed differences in average performance can be attributed to chance.

11. The mean waiting time for a customer calling a certain company's customer service center is 3 min. The manager of the service center claims that he could cut this time in half if his representative were given faster computers. The company vice president will not authorize the new expenditure unless she has evidence that the new computers will reduce the waiting time to less than 1.5 minutes. A computer company agrees to lend the computers to the manager for the purpose of gathering evidence to convince the vice president to buy the new computers. The new computers are used for 40 business days and produce a mean waiting time of 1.3 minutes with a standard deviation of .5 minutes. Set up the appropriate test. What is the p-value for this test? If the vice president will not accept evidence unless it is significant at the 0.05 level, does this p-value convince her? Explain why or why not.

Please sign the following: I have neither given nor received unauthorized aid on this piece of work, nor have I knowingly tolerated any violation of the Honor Code. _____