

**Math 130: Introductory Statistics**

**Instructor: Murray, James**

**Exam 2**

**Due Tuesday, July 28 at beginning of class. Late exams will earn zero credit.**

**Directions:** Answer the following questions on separate sheets of paper. All answers must be very neat and very clearly legible. If it is difficult to read an answer, no credit will be given. In order to earn the most partial credit possible, whenever using a formula, write down the formula first, then write down the formula with the numbers plugged in.

*You must complete this exam on your own without assistance from anyone.* Failure to comply with this condition is considered academic dishonesty and will result in the harshest penalty that Viterbo University will allow. You are allowed to use your notes, textbook, and calculator.

1. Suppose for some sample  $\bar{x} = 17$  and  $s^2 = 9$ , and the data was shown to be normally distributed.
  - (a) (2 points) What is the z-score for  $x_i = 20$ ? What is the probability of an observation having a value of 20 or below?
  - (b) (2 points) What is the z-score for  $x_i = 25$ ? What is the probability of an observation having a value of 25 or above?
  - (c) (3 points) What is the probability of that a sample of size 15 yields a mean above 18?
  - (d) (3 points) What is the probability of that a sample of size 35 yields a mean above 18?
2. (10 points) A statistical analysis of 1000 long distance phone calls found that the length of a long distance phone calls are normally distributed with a mean equal to 240 seconds and a variance equal to 1600 seconds. What is the probability that a randomly selected call lasts less than 180 seconds?
3. (15 points) A dollar theater charges only \$2 admission for movies. These movies are slightly older than movies in most other theaters, but are recent enough that they have not yet been released on DVD. The dollar theater will make profits if and only if its customers on average spend more than \$7.50 at the snack line. A random sample of 60 customers have an average snack counter expenditure equal to \$8.50 and a standard deviation of \$3.15. Using a significance level of 5%, test the hypothesis that the theater will make profits.

4. (15 points) Sue sells sea shells on the sea shore and she is interested in estimating her monthly revenues. During the last 36 months, the average monthly revenue was \$450,000 and suppose the population standard deviation is \$200,000. Construct and interpret a 95% confidence interval for Sue's monthly revenue.
5. (15 points) To answer an age old question, scientists captured 40 woodchucks and put them through a wood chucking training program then proceeded to measure how much wood each could chuck in one hour's time. Of these 40 woodchucks, the average amount of wood chucked was 22 kilograms and the standard deviation was 12 kilograms. Construct and interpret a 99% confidence interval to find out how much wood would a woodchuck chuck if a woodchuck could chuck wood.
6. (15 points) An environmental group is interested in determining whether hybrid and other recently introduced fuel efficient vehicles have led to lower consumption of gasoline in the United States. In past summers when hybrid vehicles were not available, the average amount of gasoline consumed by Americans from Memorial Day to Labor Day was 95 gallons. They collect data on 50 drivers and find the average gasoline consumption over summer 2009 was 92.4 gallons and the standard deviation was 32.3 gallons. Using a significance level of 1%, test the hypothesis that gasoline consumption during summer 2009 was less than 95 gallons.