Math 130 - Elements of Statistics
Practice Problems Exam 3

Note: This document is designed to give you a basic idea of the types of questions you might expect on your exam. It is not all-inclusive. It should not be treated as a sample exam.

1. My scooter gets about 75 miles per gallon driving in the city. My wife's SUV gets about 17 mpg. The average miles per gallon for scooters made today is about 70 mpg with a standard deviation of 12 mpg. The average mpg for SUVs (sadly) is 15 mpg with a standard deviation of 3 mpg. Which vehicle gets better gas mileage relative to its vehicle type?

2. The mean salary for a baseball player in the major leagues this year is $\mu = 2.49$ million dollars. The standard deviation for salaries is $\sigma = 1.5$ million dollars. Find the probability that if 35 players are randomly selected, their mean salary will be greater than 3 million dollars.

3. The makers of Plop-plop candies inform you that packages of Plop-plop are produced with a mean of $\mu = 34$ pieces of candy per package with a standard deviation of $\sigma = 2.3$, and that this distribution is normal. If you buy one package, find the probability of each of the following events: 1) between 34 and 38 pieces. 2) less than 30 pieces. 3) between 30 and 35 pieces. 4) between 35 and 40 pieces.

4. Assume that the finishing times for women running the New York City marathon have a normal distribution with a mean of 215 minutes and a standard deviation of of 46 minutes. If you wanted to look at the women who finished in the top 5% (note these are the people with the lowest times), what time would you chose as the cutoff?. What would the cutoffs be for the women who finished in the middle 10%?

5. Specifications for gold electroplating at a jewelry maker require the thickness of the plating to be between 254 and 292 nanometers. If the population thickness is normally distributed with a mean of $\mu = 271$ nanometers and a standard deviation of $\sigma = 12$ nanometers, what percentage of the electroplating does not meet specifications?

6. The number of miles per gallon achieved by Toyota Prius cars in city driving is normally distributed with a mean of $\mu = 52$ mpg and a standard deviation of $\sigma = 2.5$ mpg. Toyota wants to advertise that 90% of their cars get more than x miles per gallon. Find the value x that would make the statement true.

7. Assume that women's weights are normally distributed with a mean, $\mu = 143$ lbs. and standard deviation, $\sigma = 29$. Find the probability that:

   (a) One woman randomly selected will weigh more than 165 lbs.

   (b) 64 women randomly selected will have a mean weight greater than 165 lbs.

   (c) One woman randomly has weighs between 130 and 140 lbs.

   (d) 50 women randomly selected will have a mean weight between 130 and 140 lbs.

8. IQ scores are normally distributed with a mean of 100 and standard deviation of 15. If 39 people are randomly selected, what is the probability that their mean IQ score is between 100 and 120.

9. A multiple choice test consists of 30 questions, each with five possible answers.

   (a) What test can you perform to decide if a normal approximation to the binomial distribution is appropriate.

   (b) Estimate the probability that by randomly guessing a person would get between 4 and 6 questions correct.

   (c) Estimate the probability of getting fewer than 10 questions correct.

10. You take a final exam which is simply 20 true or false questions. Unfortunately, instead of studying, you decided to see how many phone numbers in the phone book you could memorize. You decide to flip a coin for each problem, heads you guess true, tails you guess false. What is the probability that you will get more than 12 questions correct?