_____ Math-3 _____

Name HW #7-2 Period

1. Answer the following questions about normal distributions.

   a. A normal distribution depends on the mean and the standard deviation.

   True/False Why?

   b. The mean, median, and mode are equal in a normal distribution.

   True/False Why?

   c. A normal distribution is bimodal.

   True/False Why?

   d. In a normal distribution, 50% of the population is within one standard deviation of the mean.

   True/False Why?

2. Explain why you think the average height of American adults is uni-modal (or is it bi-modal)?

3. Danny has a raw score of 75 on his math test. The mean for the math test was 81 with a standard deviation of 2. He scored a 92 on his science test. The mean for the science test was 98 with a standard deviation of 3. Which test did he do better on relative to those taking the test? Justify your answer by using statistics to compare the percentage of students who scored lower for each test.

4. One of the most common examples of a normal distribution is the distribution of scores on standardized tests like the ACT. In 2010, the mean score was 21 with a standard deviation of about 5.

   a. What percentage of students scored below 21?

   b. About what percentage of students scored below 16?

   c. About what percentage of students scored between 11 and 26?

   d. What is the probability of picking a student at random who scores above a 31 on the ACT? (The areas in the regions of the standard normal distribution can be thought of as probabilities of having a randomly selected individual getting a score in that interval of the score scale.)

5. Many students like to eat microwave popcorn as they study for the ACT. Microwave popcorn producers assume that the time it takes for a kernel to pop is normally distributed with a mean "time-to-pop" of 120 seconds and standard deviation of 13 seconds for the standard microwave oven. If you're a devoted popcorn studier, you don't want a lot of "old maids" (un-popped kernels) but you know that if you leave the bag in long enough to be sure that all the kernels are popped, some of the popcorn will burn. How much time would you recommend for microwaving the popcorn? Use a normal distribution curve and the features of the curve (areas, measures of spread, etc.) to explain your answer.

6. National Basketball players have heights that are normally distributed with a mean of 6'8'' (convert to inches) and a standard deviation of 3.4 inches (Wikipedia). Gregg is considered unusually tall in his high school class. He is 6'1" tall.

    a. What percentage of NBA players are taller than Gregg?
    b. What percentage are shorter
    c. How tall would Gregg have to be in order to be in the top 2.5% of NBA player heights

7.

A grocery store wants to know the average number of items that shoppers purchase in each visit to the store. They decide to count the items in the cart of every twentieth person through the check stand.

Population _____

Sample _____

Parameter of interest _____

8. In question #7 above, why did the store only ask every 20th person? (Give two reasons based upon the discussion in the lesson).

9. Which of the following methods of sampling is better? Explain why.
    a.

You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You decide to put the name of each student in the school into a big bowl. You draw 100 names and ask those students to respond to a survey about the activities they prefer.

b.

You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You stand in the cafeteria during your lunch break and ask students in they would be willing to participate in your survey as they walk by.

10. We learned about three types of Statistical Studies: (1) Sample Study, (2) Experimental Study, and (3) Observational Study. Identify the type of study that was used for the following:

a. To determine whether drinking orange juice prevents colds, researchers randomly assigned participants to a group that drank no orange juice or a group that drank two glasses of orange juice a day. They measured the number of colds that each group had over the course of the year and compared the results of the two groups.

b. To determine whether exercise reduces the number of headaches, researchers randomly selected a group of participants and recorded the number of hours each participant exercised and the number of headaches each participant experienced.

c. To determine the effectiveness of a new advertising campaign, a restaurant asked every tenth customer if they had seen the advertisement, and if it had influenced their decision to visit the restaurant.

d. To determine if a new drug is an effective treatment for the flu, researchers randomly selected two groups of people that had the flu. One group was given a placebo (a sugar pill that has no physical effect) and one group was given the new drug. Researchers measured the number of days that participants experienced flu symptoms and compared the two groups to see if they were different.

e. To determine if higher speed limits cause more traffic fatalities, researchers compared the number of traffic deaths on randomly selected stretches of highway with 65 mph speed limits to the number of traffic deaths on an equal number of randomly selected stretches of highway with 75 mph speed limits.

11. In 1897 Amos Dolbear published an article in which he provided temperature data and the chirp rate (# chirps per minute) of the snowy tree cricket (not your average field cricket). The data is provided in the table below:

a. What type of study is this?
b. Graph the data.
c. Is there a correlation between the two sets of data? (positive correlation, negative correlation or no correlation).
d. Does correlation mean the same thing as one parameter being the cause of another parameter? Why or why not?

Temp (F)	60	70	75	85	88
# chirps/min	80	118	138	182	190