Probability and Statistics Summer Assignment

Name: _____

This assignment is intended to get you to think a little about statistics. It is due on the first day of school. Most questions should be answered by Internet searches. Some questions ask for your thoughts, so that answers will vary.

1. In 1936 the magazine *Literary Digest* conducted a poll and predicted that Alf Landon would defeat Franklin Roosevelt in the presidential election. Their prediction was wrong. Why?

2. How do you think *Literary Digest* could have changed their methods to avoid their mistake?

3. A teacher wants to know the average time spent on homework by Gulf High School students. To get an estimate, he surveys the students in one of his classes and calculates the average of all of the responses. What do you think is a flaw in this method?

4. Describe a better way to estimate the time spent on homework, other than surveying every student in the school.

5. A study will be conducted to see whether a new prescription drug is effective in lowering blood pressure. One hundred persons will participate in the study. Fifty will take the new drug and the other fifty will not. How would you choose which persons in the study take the actual drug?

6. List four methods of statistical sampling, and give a brief definition of each.

7. Name these Greek letters and tell what they represent in statistics. μ, σ, ρ, Σ.

8. Make a list of 5 different numbers such that the median is less than the mean. Show the numbers and the median and the mean of your list of numbers.

9. Use a calculator to evaluate to the nearest thousandth $1.96\sqrt{\frac{(0.6)(0.4)}{20}}$. Hint: the answer is approximately 0.2.

10. Search the Internet for a normal distribution calculator. Given that IQ's have a mean (average) of 100 and a standard deviation of 15, find the percent of people with IQ's above 130.

11. Search the Internet for a binomial probability calculator. Find the probability that you will make exactly 12 baskets if you make 20 attempts and it is known that your shooting percentage is 60%.

12. Use the following data: 12, 40, 62, 70, 72, 77, 80, 80, 80, 82, 83, 83, 83, 86, 88, 91, 91, 94, 100. Find the median and the first and third quartiles. Draw a box-and-whisker plot.

13. Was the data in the preceding problem left-skewed, right-skewed, or approximately symmetrical?

14. Suppose that the equation $S = 16h + 20$ predicts your test score S if you study h hours. By how much would you expect your score to increase with one additional hour of study?

15. Suppose that your Probability and Statistics teacher finds that the semester 1 average of students who actually completed this assignment over the summer is 8 points higher than the semester 1 average of students who did not do this assignment. Discuss why or why not the teacher should conclude that doing the assignment caused higher grades.

16. Evaluate $\frac{10!}{7!(10-7)!}$, where ! is the factorial symbol.

17. Suppose that 14% of persons are left-handed. In a class of 25 students, how many would you expect to be left-handed?

18. Suppose that you toss a coin 10 times, but your friend, who has much more time and is not easily bored, tosses a coin 1,000 times. What would happen, according to the Law of Large Numbers?

19. In how many distinguishable ways can the letters BUCCANEERS be arranged? (Search the Internet for *distinguishable permutations*.)

20. Under Florida law, teachers' salaries may depend partly on their annual evaluations, which are based partly on how well their students perform on standardized tests. The goal is to pay better teachers more money. Discuss in a few sentences why you think this is a good or bad idea.