**Honors Math 3 Statistics Unit Review**

*Include a diagram where appropriate and write all answers in a complete sentence.*

1. In 1995, the College Board adjusted the scale on the math SAT test, which made it difficult to compare scores on tests taken before 1995 (when the mean score was 470 with a standard deviation of 110) and tests taken after 1995 (when the mean score was 500 with a standard deviation of 100). Colleen took the test in 1994 and scored a 500. Her sister Jane took the test in 1996 and scored a 520. Which girl did better?

2. The heights of American men aged 18 to 24 are approximately normally distributed with mean 68 inches and standard deviation 2.5 inches.  John is 70” tall. He tells his friends that he is taller than 90% of American men. Is he correct?

3. The scores on the Statistics test in a Common Core Math 3 class typically have a mean of 80 and a standard deviation of 8.5.

a) What is the probability that a randomly selected student will have a score between 78 and 85?

b) A group of 150 students takes a test. Find the number of students who scored higher than 92.

4. Mrs. Williams told her principal that her class performed extremely well on the end of course test. She reported that all of her students scored over the district average and the z-score for her top student was – 1.3. Comment on Mrs. Williams’ report to the principal.

5. A distribution of scores has a standard deviation of 10. Find the z-scores corresponding to the following values:

A score that is 20 points below the mean

A score that is 10 points below the mean

A score that is 15 points above the mean

A score that is 30 points below the mean

6. Jacob and Emily took the same standardized test, but with different groups of students. They both received a score of 87. In Jacob’s group, the mean was 80 and the standard deviation was 6. In Emily’s group, the mean was 84 and the standard deviation was 4. Did either student score in the top 16% of his or her group? Explain your answer thoroughly.

7. A fishing tournament is sponsored by a local sporting goods store. The results of a fishing tournament with 50 participants, posted by the number of total pounds of fish caught, are normally distributed with a mean weight of 32.2 lb and a standard deviation of 5.8 lb. Find the number of participants who finished with a total number of pounds of fish between 28.0 and 38.0 pounds.

8. Determine whether each sampling method is appropriate or not. If the method is not appropriate, briefly discuss why not.

a. A student stands outside an expensive restaurant and asks customers their opinion on welfare.

b. The NRA asks subscribers to their magazine to call a toll-free number and take a poll on gun control.

c. A researcher stands outside a grocery store and asks shoppers about their weekly grocery bill.

9. The owner of a health club with 1000 members is concerned about the friendliness of his staff. He decides to survey 50 members. What type of sampling does each of the following methods represent?

a. Leave a stack of response cards by the sign-in desk with a sign asking members to participate.

b. Put each name on a single slip of paper. Place all of the slips in a hat and mix well. Draw one slip out and note the name. Continue picking until the names of 50 members are selected.

c. Ask the first 50 members who enter the club one morning.

d. Ask every 10th person who enters the club one day.

e. Pick the names of 25 women out of a hat; then pick the names of 25 men out of a hat.

f. Which, if any, of the 4 methods above will create a random sample?

10. A research firm is interested in finding out how many hours the average teenager works at any after-school job during the school year. The company sends 5 employees to the local mall on Saturday afternoon to conduct a survey. Discuss, using complete sentences, whether or not this method of gathering data is legitimate.

11. A student in AP Statistics is interested in finding out how many students believe that the dress code is reasonable. He asks a sample of senior girls the following question: “Do you agree that the dress code is old-fashioned and that it’s hard to buy clothes that fit the current dress code?” Is this a fair question? Explain your answer.

12. If our class was interested in finding out whether students really do have a problem with the dress code, what would be the best way to select a sample of 100 students to ask?

13. ***Reword each of the following survey questions to eliminate bias.***

a) A random sample of residents of a city with high traffic congestion is asked: “Are you in favor of

widening the main street to reduce congestion?”

b) During an election campaign, voters are asked: “Do you agree that, because they have reduced taxes to a postwar low, the current government should be re-elected to continue their great work?”

c) A marketing firm hired by a movie company asks: “Which of the following movies should

be named Movie of the Year?”

d) A government pollster asks: “Unemployment is at an extremely high level. Are you in favor of government policies to spend money to create jobs in your community?”

17. You can choose to play one of two games. Each game costs one dollar to play.

*Game 1:* A wheel with three numbers on it--zero, one, and two--is spun so that there is a 40% chance that the wheel lands on zero, a 10% chance the wheel lands on one, and a 50% chance the wheel lands on two. You get back the amount in dollars of the number that the wheel lands on.

*Game 2:* A different wheel with three numbers on it--zero, one, and two--is spun so that there is a 5% chance that the wheel lands on zero, a 80% chance the wheel lands on one, and a 15% chance the wheel lands on two. You get back the amount in dollars of the number that the wheel lands on.

a) What is the expected amount of money that you will get back from Game 1? What is the expected amount of money that you will get back from Game 2?

b) If you played these games every second of every day for the rest of your life, which statement is most likely to be true: a) you will make more money playing Game 1; (b) you will make more money playing Game 2; or, (c) you will make the same amount of money playing either game. Justify your answer.

c) In Game 1, what is the probability that you will not lose money? In Game 2, what is the probability that you will not lose money?

14. At an investment tax seminar, Judy Johnson estimates that 20 people will attend if it does not rain and 12 people will attend if it does rain. The weather forecast indicates that there is a 60% chance of rain on the day of the seminar. Determine the expected number of people who will attend the seminar.

15. The Palm Coast investment club is considering purchasing a certain stock. After considerable research, the club members determine that there is a 60% chance of making $8000, a 10% chance of breaking even and a 30% chance of losing $6200. Find the expected value of this purchase.

16. An airline is considering adding a route to the city of Austin. There are many factors to consider before they decide. After research, the company estimates the following—there is a 70% chance of making an $800,000 profit, a 10% chance of breaking even, and a 20% chance of losing $1,200,000. How much can the company expect to make on this new route?