Statistics 13V NAME:______________________________

Quiz 8 Last six digits of Student ID#:____________________

For multiple choice questions circle the best answer. For other questions provide the information requested. Each problem is worth 10 points unless specified otherwise. ***Open book and notes.***

1. Which of the following examples involves **paired data**?
   A. A study compared the average number of courses taken by a random sample of 100 freshmen at a university with the average number of courses taken by a separate random sample of 100 freshmen at a community college.
   B. A group of 100 students were randomly assigned to receive vitamin C (50 students) or a placebo (50 students). The groups were followed for 2 weeks and the proportions with colds were compared.
   C. A group of 50 students had their blood pressures measured before and after watching a movie containing violence. The mean blood pressure before the movie was compared with the mean pressure after the movie.
   D. None of the above.

2. The weights of a sample of $n = 8$ college men will be used to create a 95% confidence interval for the mean weight of all college men. What is the correct t^* multiplier involved in calculating the interval?

   Df = n – 1 = 8 – 1 = 7, so in Table A.2 read the df row labeled 7 and the column with confidence level .95, to find t = 2.36.*

3. Which of the following statements is most correct about a confidence interval for a mean?
   A. It provides a range of values, any of which is a good guess at the possible value of the sample mean.
   B. It provides a range of values, any of which is a good guess at the possible value of the population mean.
   C. It provides a good guess for the range of values the sample mean is likely to have in repeated samples.
   D. It provides a good guess for the range of values the population mean is likely to have in repeated samples.

Scenario for Questions 4 and 5: A research firm was interested in the mean number of students in the senior class at private high schools in a certain state in the United States. They took a random sample of 50 private schools, and computed the mean number to be 87, with a standard deviation of 42.

4. If a different random sample of 50 schools were to be taken from the same population, which of the following would *not* change?
   A. The sample mean.
   B. The sample standard deviation.
   C. The standard deviation of the sampling distribution of sample means.
   D. The standard error of the mean.

5. (**20 pts**) Find a 95% confidence interval for the mean number of students in the senior class for the population of private schools in the state.

   Sample mean = 87 students, standard error = $\frac{s}{\sqrt{n}} = \frac{42}{\sqrt{50}} = 5.94$*, df = 50 – 1 = 49, so t* = 2.01 (or 2.02)*

   A 95% confidence interval is 87 ± (2.01)(5.94) or 87 ± 11.94 or 75.06 to 98.94 (or 87 ± 12; 75 to 99).

Scenario for Questions 6 to 9: A golf resort would like to determine whether people gain or lose weight (or neither) on average, during a two-week stay at the resort, when they are likely to be eating more, but also exercising more than usual. They plan to measure a random sample of adult guests who stay two weeks, and measure their weight at the beginning and end of the stay, then take the difference (beginning weight – ending weight). Suppose in fact that for the relevant population, weight gains are normally distributed with mean of 0, and standard deviation of 5 pounds.

6. (**5 pts**) What is the population of interest? Be explicit.

   The population is all past, present and future adult guests of the resort who stay two weeks.

7. (**5 pts**) What is the parameter of interest? Use proper notation, and define it in the context of the example.

   This is a paired difference situation. The parameter of interest is μ_d = mean difference in weight from the beginning of the say to the end of the stay, for the population defined in question 6.

8. (**20 pts**) Suppose a random sample of 25 customers is taken, and their weights are measured at the beginning and end of the two-week stay, then the difference is calculated as "beginning weight – ending weight." Describe the sampling distribution of the sample mean for these differences, including its shape, its mean and its standard deviation. You may draw a picture of the distribution if you wish, to help in answering the next question. Use appropriate notation. (Recall that for the relevant population, weight gains are normally distributed with mean of 0, and standard deviation of 5 pounds.)

   The sampling distribution is approximately normal.
   Its mean is the mean of the population of differences, $\mu_d = 0$.
   Its standard deviation is $\frac{\sigma}{\sqrt{n}} = \frac{5}{\sqrt{25}} = 1.0$

9. What is the probability that the mean of the sample of weight gains will exceed 2 pounds? Show your work.
   *There is the correct way to do this problem based on what is asked, and then there is what I thought I was asking, and what most of you thought I was asking! Therefore, I'm giving credit for both. Notice that the differences are actually defined to be (beginning weight – ending weight), which means positive values correspond to weight **loss**, not weight **gain**. Therefore, given the wording (which I didn't intend) a weight **gain** exceeding two pounds is the same as a weight **loss** of −2 or less.*

   Thus, the correct answer is $P(\bar{d} < -2) = P(Z < \frac{-2-0}{1.0})$ *= P(Z <− 2) = .0228.*

   However, I am also giving credit for what I intended to ask, which is $P(\bar{d} > 2) = P(Z > \frac{2-0}{1.0})$ *= P(Z > 2)*

   = .0228.