Math 216
Chapter 5 and 6 Clicker Questions

1. Two methods are used to predict the shear strength for steel plate girders. Each method is applied to nine specific girders and the ratio of predicted load to observed load is calculated for each method and each girder. Are these paired or unpaired data?

   (A) Paired
   (B) Unpaired

2. Two catalysts are being analyzed to determine how they affect the mean yield of a chemical process. Catalyst 1 is used in the process eight times and the yield in percent is measured each time. Then catalyst 2 is used in the process eight times and the yield is measured each time. Are these paired or unpaired data?

   (A) Paired
   (B) Unpaired

3. Six river locations are selected and the zinc concentration is determined for both surface water and bottom water at each location. Are these paired or unpaired data?

   (A) Paired
   (B) Unpaired

4. In our polling example, in which $n = 52$, approximately what sample size would you need if you wanted to cut the margin of error in half?

   (A) 25
   (B) 100
   (C) 200
   (D) 400

5. Which of the following does *not* result in a larger margin of error?

   (A) Increasing the confidence level
   (B) Decreasing the sample size
   (C) Having a larger population size

6. Suppose a random sample of 10 Vanderbilt undergraduates is found to have an average height of 67 inches and a sample standard deviation of 3 inches. Here's a possible 95% confidence interval for the average height of the entire population of Vanderbilt undergraduates:

$$67 \pm 1.96 \frac{3}{\sqrt{10}}.$$

   Why is this confidence interval incorrect? Assume that the heights of the entire population of Vanderbilt students are normally distributed.

   (A) Since the sample size is small, the sample mean doesn't have a nearly normal distribution, so we can't construct a confidence interval from this sample.
   (B) Since the sample size is small, we can't approximate the population standard deviation with the sample standard deviation.
   (C) Since the sample size is small, we don't have independence of observations and thus can't construct a condidence interval.
   (D) The sample size is just too small for us to be able to make inferences about the entire population.

7. Suppose a random sample of size $n = 50$ of ball bearings produced by a particular machine is taken and the diameter of each ball bearing in the sample is measured. Suppose that for this sample, $\bar{x} = 5.14$ and $s = 0.34$. Which of the following is the corresponding 95% confidence interval for the population mean μ?

   (A) $5.14 \pm z^* \frac{0.34}{\sqrt{50}}$

   (B) $5.14 \pm t^*_{49} \frac{0.34}{\sqrt{50}}$

   (C) There is not enough information given to construct a 95% confidence interval for μ.

8. Suppose a random sample of size $n = 10$ of ball bearings produced by a particular machine is taken and the diameter of each ball bearing in the sample is measured. Suppose that for this sample, $\bar{x} = 5.14$ and $s = 0.34$. Which of the following is the corresponding 95% confidence interval for the population mean μ?

   (A) $5.14 \pm z^* \frac{0.34}{\sqrt{10}}$

   (B) $5.14 \pm t^*_{9} \frac{0.34}{\sqrt{10}}$

   (C) There is not enough information given to construct a 95% confidence interval for μ.

9. Suppose a random sample of size $n = 10$ of ball bearings produced by a particular machine is taken and the diameter of each ball bearing in the sample is measured. Suppose that for this sample, $\bar{x} = 5.14$ and $s = 0.34$. Suppose also that a probability plot for this sample indicates that it comes from a distribution that is fairly normal. Which of the following is the corresponding 95% confidence interval for the population mean μ?

   (A) $5.14 \pm z^* \frac{0.34}{\sqrt{10}}$

   (B) $5.14 \pm t^*_{9} \frac{0.34}{\sqrt{10}}$

   (C) There is not enough information given to construct a 95% confidence interval for μ.

10. Conducting a two-sample t-test requires that the underlying populations for both samples be normal. Which of the following are methods for checking this normality assumption? *(Multiple Mark)*

    (A) Calculating the correlation coefficient R for the two samples.

    (B) Constructing a normal probability plot for each sample and making sure the points are roughly linear.

    (C) For each sample, checking to see if 67% of the data is within 1 standard deviation of the mean, 95% within 2 sd's, and 99% within 3 sd's.

    (D) Making sure each sample has at least 50 observations in it.

    (E) Constructing a histogram for each sample and making sure it's unimodal and not too skewed.

Answers

1. A
2. B
3. A
4. C
5. C
6. B
7. A or B. The sample size is large enough that we can go with A, but there will be very little difference between A and B in this case.
8. C. We don't know if the underlying distribution is normal, which is required to use a t-test.
9. B
10. B, C, and E. All three are a bit risky when dealing with small samples, however.