Mini Math
January 10

1. Which of the following statements is incorrect?
   (a) The larger the sample is, the larger the spread is in the sampling distribution.
   (b) Provided that the population site is significantly greater than the sample size, the spread of a sampling distribution does not depend on the population size.
   (c) Bias has to do with the center, not the spread, of a sampling distribution.
   (d) The sample distribution and sampling distribution refer to different things.
   (e) The larger the sample is, the closer the sample distribution generally becomes to the population distribution.

2. Which of the following statements is incorrect?
   (a) The sampling distribution of $\overline{x}$ has a mean equal to the population mean μ even if the sample size n is small.
   (b) The sampling distribution of $\overline{x}$ has a standard deviation of $\frac{\sigma}{\sqrt{n}}$ even if the population is not normally distributed and even if n is small.
   (c) The sampling distribution of $\overline{x}$ is normal, no matter what n is, if the population has a normal distribution.
   (d) When n is large, the sampling distribution of $\overline{x}$ is approximately normal even if the population is not normally distributed
   (e) Even if the observations are not independent, the central limit theorem applies as long as n is large enough.

3. Which of the following is a true statement?
   (a) The sampling distribution of $\hat{p}$ has a mean that can vary from the population proportion p by approximately 1.96 standard deviations
   (b) The sampling distribution of $\hat{p}$ has a standard deviation equal to $\sqrt{np(1-p)}$
   (c) The sampling distribution of $\hat{p}$ is considered close to normal provided that $n \geq 30$.
   (d) The sample proportion is a random variable with a probability distribution.
   (e) All of the above are true statements.

4. Which of the following statements is incorrect?
   (a) Sample statistics are used to make inferences about population parameters.
   (b) Statistics from smaller samples have more variability than those from larger samples.
   (c) Parameters are fixed, while statistics vary depending on which sample is chosen.
   (d) As the sample size n becomes larger, the sample distribution becomes closer to a normal population.
   (e) All of the above are true statements.

5. The owner of a donut shop advertises that the price of a dozen donuts on any given day will be randomly picked using a normal distribution with a mean of \$10.00 and a standard deviation of \$0.50. If a customer buys a dozen donuts on each of the five days, what is the probability that he will pay a total exceeding \$52.00?

6. Suppose that 15 percent of the mines in a particular Alaskan will strike gold. In a random sample of 200 mines in this region what is the probability that more than 18 percent will strike gold?

7. 6.7 percent of people graduate college with STEM degrees. In a simple random sample (SRS) of 1000 people, what is the probability that more than 8 percent will graduate college with a STEM degree?