

Statistics  
Unit 8 Review #3

Name \_\_\_\_\_

1. A random sample is to be selected from a population. For which combination of  $n$  and  $p$  is it reasonable to assume that the sampling distribution of the sample proportion  $\hat{p}$  will be approximately normal?

- A.  $n = 10$  and  $p = .4$
- B.  $n = 25$  and  $p = .5$
- C.  $n = 30$  and  $p = .2$
- D.  $n = 40$  and  $p = .1$
- E.  $n = 100$  and  $p = .05$

2. Suppose that 50% of those taking a national licensing exam pass the exam on the first attempt. A random sample of  $n = 100$  people taking the exam for the first time will be selected. If  $\hat{p}$  is the proportion in the sample that pass the exam on the first attempt, what are the mean and standard deviation of the sampling distribution of  $\hat{p}$ ?

- A. The mean is .5 and the standard deviation is .25.
- B. The mean is .5 and the standard deviation is .025.
- C. The mean is .5 and the standard deviation is  $\sqrt{.0025}$
- D. The mean is .25 and the standard deviation is .25.
- E. The mean is .25 and the standard deviation is  $\sqrt{.0025}$

3. The mean of a population is 83 with a standard deviation of 5. A sample of size 40 is taken. What are the mean and the standard deviation for this sample expected to be?

- A. 83 and 5 respectively
- B. 83 and  $\frac{5}{40}$  respectively
- C. 83 and  $\frac{5}{\sqrt{40}}$  respectively
- D. 83 and  $\sqrt{\frac{5}{40}}$  respectively
- E. 40 and  $\sqrt{\frac{5}{40}}$  respectively

4. As a result of the recent recession in the United States, home values also dropped. A survey of 50 recent house sales in a large urban community found the average home sale price had dropped by \$72,000. \$72,000 is called a

- A. proportion
- B. population
- C. parameter
- D. statistic
- E. sample

5. A population has  $\mu = 78$  and a standard deviation  $\sigma = 4.8$ . What would be the mean and standard deviation of the sampling distribution  $\bar{x}$  if a sample of 100 were taken?

- A.  $\mu_{\bar{x}} = 78, \sigma_{\bar{x}} = 0.048$       B.  $\mu_{\bar{x}} = 78, \sigma_{\bar{x}} = 0.48$       C.  $\mu_{\bar{x}} = 78, \sigma_{\bar{x}} = 4.8$   
D.  $\mu_{\bar{x}} = 78, \sigma_{\bar{x}} = 48$       E.  $\mu_{\bar{x}} = 78, \sigma_{\bar{x}} = 0.0048$

6. The Central Limit Theorem states

- A. when  $n$  is sufficiently large, the sampling distribution  $\bar{x}$  is roughly approximated by the normal curve  
B. if the population distribution is normal, then the sampling distribution  $\bar{x}$  will also be normal for all sample sizes  $n$   
C.  $\mu_{\bar{x}} = \mu$   
D.  $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$   
E. All the above properties make up the Central Limit Theorem

7. It is believed that currently 37% of Americans have at least one flat screen television in their homes. A sample of 150 Americans is surveyed. What is true about that sample?

- A.  $\mu_{\hat{p}} = 0.37$  and  $\sigma_{\hat{p}} = \sqrt{0.37(0.63)}$       B.  $\mu_{\hat{p}} = 0.37$  and  $\sigma_{\hat{p}} = \frac{\sqrt{0.37(0.63)}}{150}$   
C.  $\mu_{\hat{p}} < 0.37$  and  $\sigma_{\hat{p}} = \sqrt{0.37(0.63)}$       D.  $\mu_{\hat{p}} < 0.37$  and  $\sigma_{\hat{p}} = \frac{\sqrt{0.37(0.63)}}{150}$   
E.  $\mu_{\hat{p}} = 0.37$  and  $\sigma_{\hat{p}} = \sqrt{\frac{0.37(0.63)}{150}}$

8. 43% of the people in a particular county are Democrats. A sample of 200 people is collected at random. The approximate probability that more than 50% of the people selected are Democrats is

- A. 0.463      B. 0.388      C. 0.038      D. 0.023      E. 0.012

9. A study of voting chose 663 registered voters at random shortly after an election. Of these, **72%** said they had voted in the election. Election records show that only **56%** of registered voters voted in the election. Which of the following statements is true about the boldface numbers?

- A. 72% is a sample; 56% is a population
- B. 72% and 56% are both statistics
- C. 72% is a statistic and 56% is a parameter
- D. 72% is a parameter and 56% is a statistic
- E. 72% and 56% are both parameters

10. The central limit theorem is important in statistics because it allows us to use the Normal distribution to make inferences concerning the population mean

- A. if the sample size is reasonable large (for any population)
- B. if the population is Normally distributed and the sample size is reasonably large
- C. if the population is Normally distributed (for any sample size).
- D. if the population is Normally distributed and the population variance is known (for any sample size)
- E. if the population size is reasonably large (whether the population distribution is known or not).

11. About 6% of Americans have Type O blood, making them universal donors. The Red Cross expects about 250 people to donate at an upcoming blood drive. For planning purposes, the Red Cross wonders what percentage of these volunteers might be universal donors.

a. What is the mean and standard deviation of the sampling distribution  $\hat{p}$ , the proportion of volunteers who have Type O blood?

b. Check to see if a normal curve is a reasonable approximation for this study.

c. What is the probability that fewer than 4% of the volunteers have Type O blood?

12. Suppose that the number of movies viewed in the last year by high school students has an average of 19.3 with a standard deviation of 15.8. Suppose we take an SRS of 100 high school students and calculate the mean number of movies viewed by the members of the sample. Let  $\bar{x}$  be the mean number of movies viewed.

a. Explain why you can't determine the probability that the number of movies viewed by a single student exceeds 20?

b. What are the mean and standard deviation of the sampling distribution of  $\bar{x}$ ?

c. What is the shape of the sampling distribution of  $\bar{x}$ ? Justify your answer.

d. Find the probability that the mean number of movies viewed by the sample of 100 students exceeds 20? Show your work.

13. The superintendent of a large school district wants to know what proportion of middle school students in her district are planning to attend a four-year college or university. Suppose that 80% of all middle school students in her district are planning to attend a four-year college or university. What is the probability that an SRS of size 125 will give a sample proportion of at most 75%?