Name:_____ Date:_____

AP Statistics Chapter 9 Sampliing Distribution:

Short Answer Questions: Write a short answer for each of the following:

1. If you wish to ***reduce*** the amount of variability in a statistic that we hope to use to estimate a parameter, then what is the best way to accomplish this?

2. Two polling companies are completing a survey of its residents. One company plans to survey 2500 residents, and the other plans to survey 3100 residents. Which of the ***sampling distributions*** would have the smaller standard error?

3. A survey in 2006 of 500 randomly selected Kentuckians found that 74% of them rooted for the Wildcats, 21% of them supported the Cards, and 5% of them supported neither. Suppose that the *actual* percentage of Wildcat supporters was 63%.

a) ***What is*** $\mu_{\hat{p}}$? B) Is 63% a ***parameter*** or a ***statistic***?

4. A survey in 2006 of 500 randomly selected Kentuckians found that 74% of them rooted for the Wildcats, 21% of them supported the Cards, and 5% of them supported neither. Suppose that the actual percentage of Wildcat supporters was 63%.

a) What would the ***standard error*** ($\sigma_{\hat{p}}$) be?

b) What ***condition*** must be met in order to complete the calculation stated in part a?

5. A member of our boy's basketball team makes 70% of his free throw shots. Due to the fact that this player is a starter and will play many minutes in each game, he will make exactly 100 free throw attempts by season's end. Assuming that each free throw is ***independent***, what is the ***probability*** that his number of made free throws *exceeds* 70?

6. In simplistic language, state the main idea of the **Central Limit Theorem**.

7. In simplistic language, state the main idea of the **Law of Large Numbers**

8. What EXACTLY is the condition ***(FOR PROPORTIONS)*** that must be met in order to conclude that a '**normal approximation**' can be made (i.e.: distribution is normal)?

9. What is the formula for standardizing (find a z-score) for a proportion?

10. What is the formula for standardizing (find a z-score) for a ***sample mean***?

11. If we take many simple random samples (SRS's) from the exact same population what do we expect to have happen?

12. The chipmunk population in a certain area is known to have a mean weight of 84 grams and a standard deviation of 18 grams. A wildlife biologist weighs 9 chipmunks that have been caught in live traps before releasing them. ***What are the values of*** $\mu_{\bar{x}}$? and $\sigma_{\bar{x}}$?

13. The weight of eggs produced by a farm are approximately Normally distributed with mean of 65g and SD of 5g.
    i) What is the probability that a randomly selected egg weighs between 62.5g and 68.75g?

    Ii) A carton of eggs has 12 eggs. Calculate the probability that mean weight of a carton of eggs is between 62.5 to 68.75g

Multiple Choice Questions:

1. Which of the following statements regarding the Central Limit Theorem is true?

a) Regardless of the shape of the population's distribution, the sampling distribution of the sample mean from sufficiently large samples will be approximately Normally distributed
b) Regardless of the shape of the population's distribution, the SD of the sampling distribution of the sample mean from sufficiently large samples will be $\frac{\sigma}{n}$
c) Regardless of the shape of the population's distribution, the mean of the sampling distribution of the sample mean from sufficiently large samples will be equal to the mean of the population
d) AS you take larger and larger samples from a Normally distributed population, the SD of the sampling distribution of the sample mean gets smaller and smaller
e) As you take larger and larger samples from a Normally distributed population, the mean of the sampling distribution of the sample mean gets closer and closer to the population mean

2. Which of the following would be a preferred characteristic of an estimate of a parameter?

a) A statistic with high variability and low bias
b) A statistic with high variability and high bias
c) A statistic with low variability and low bias
d) A statistic with low variability and high bias

3. Which of the following best describes a sampling distribution?

a) The distribution of all values of a statistic found in a large number of simulated samples of size *n*.
b) The set of all values of a variable in a sample of size *n*.
c) The set of all values of a variable in a large number of samples of size *n*.
d) The distribution of parameter values in all possible samples of size *n*.
e) A probability distribution that describes the relative likelihood of all possible values of a statistic.

4. In a large population of adults, the mean IQ is 112 with a standard deviation of 20. Suppose 200 adults are randomly selected for a market research campaign. The sampling distribution of the sample mean IQ is

a) exactly Normal, mean 112, standard deviation 20.
b) approximately Normal, mean 112, standard deviation 0.1.
c) approximately Normal, mean 112, standard deviation 1.414.
d) approximately Normal, mean 112, standard deviation 20.
e) exactly Normal, mean 112, standard deviation 1.414

5. Suppose you are sampling from a distribution that is strongly skewed left. Which of the following statements about the sampling distribution of the sample mean is true?

a) As the sample size increases, the shape of the sampling distribution gets closer and closer to a Normal distribution.
b) As the sample size increases, the shape of the sampling distribution gets closer and closer to the shape of the population distribution.
c) As the sample size increases, the mean of the sampling distribution gets closer to the population mea
d) Regardless of the sample size, the shape of the sampling distribution is similar to the shape of the population distribution.
e) Regardless of the sample size, the standard deviation of the sampling distribution is approximately equal to the standard deviation of the population.

6. Suppose we wish to estimate the percentage of students who smoke cigarettes at each of several colleges and universities. Two of the colleges are Wabash College (enrollment 900) and Purdue University (enrollment 36,000). What should the relative size of our samples be from each school if we want the two sampling distributions to have approximately the same standard deviation?

a) Because the population sizes are so different, it's impossible to make the standard deviations equal by adjusting the two sample sizes.
b) We should take a larger number of Purdue students, since there are more of them.
c) We should take a larger number of Wabash students, since there are fewer of them.
d) We should take the same size samples from each school.
e) We should take samples that are exactly 10% of each school's enrollment

7. A statistic is said to be *unbiased* if

a) the survey used to obtain the statistic was designed so as to avoid even the hint of racial or sexual prejudice.
b) the mean of its sampling distribution is equal to the true value of the parameter being estimated
c) both the person who calculated the statistic and the subjects whose responses make up the statistic were truthful.
d) the value from any sample is equal to the parameter being estimated.
e) it is used for honest purposes only.

8. A census of the labor force in a cit found that the time it takes for people to commute to work has a mean of 20.5 minutes and a SD of 15.4 minutes. What is the probability that a random sample of 40 people have a mean commute time that is greater than 25 minutes?

a) $P\left(Z > \frac{20.5-25}{\frac{15.4}{\sqrt{40}}}\right)$ b) $P\left(Z > \frac{25-20.5}{\frac{15.4}{\sqrt{40}}}\right)$ c) $P\left(Z > \frac{25-20.5}{\frac{15.4}{\sqrt{39}}}\right)$

b) c) $P\left(Z > \frac{25-20.5}{15.4}\right)$ d) $P\left(Z > \frac{20.5-25}{15.4}\right)$

9. Interpupillary distance (IPD) is the distance between the centers of the pupils of a person's left and right eyes. In adult males IPD is approximately Normally distributed wit ha mean of 62.5mm and a SD of 6mm. Suppose you randomly select 5 male adults, what is the probability that their mean IPD is greater than 60mm?

a) $P\left(z < \frac{60-62.5}{\frac{6}{\sqrt{5}}}\right)$ b) $P\left(z > \frac{62.5-60.5}{\frac{6}{\sqrt{5}}}\right)$ c) $P\left(z > \frac{60-62.5}{\frac{6}{\sqrt{5}}}\right)$

d) $P\left(z > \frac{60-62.5}{6}\right)$ e) $P\left(z > \frac{62.5-60}{6}\right)$

10. 53% of adults say they have trouble falling asleep. If a nurse contacts an SRS of 85 adults, what is the probability that over 55% will say they have trouble sleeping?

a) 31.09% b) 35.58% c) 36.4% d) 40% e) 64.42%

11. The owner of a coffee shop advertises the price of coffee on any given day will be randomly picked using a normal distribution with mean $1.35 and SD of $0.10. IF a customer buys a cup of coffee each day for 10 days, what is the probability that he will pay a total exceeding $14.00?

a) 31.6% b) 5.68% c) 30.85% d) 31.6% e) 94.32%

Answers;
