***AP Statistics*** Name___________________

*Quiz-Sampling Distributions* Date___________

**Select the best answer choice. Write the answer in the space provided.**

_____1)

In a study of the effects of acid rain, a random sample of 100 trees from a particular forest is examined. Forty percent of the trees show some signs of damage. Which of the following statements is correct?

(a) 40% is a parameter
(b) 40% is a statistic
(c) 40% of all trees in the forest show some signs of damage
(d) More than 40% of the trees in the forest show some signs of damage
(e) Less than 40% of the trees in the forest show some signs of damage

_____2)

The number of hours a light bulb burns before failing varies from bulb to bulb. The distribution of burnout times is strongly skewed to the right. The central limit theorem says that

(a) as we look at more and more bulbs, their mean burnout time gets ever closer to the mean $\mu$ for all bulbs of this type.
(b) the mean burnout time for any number of bulbs has a distribution of the same shape (strongly skewed) as the distribution for individual bulbs.
(c) the mean burnout time for any number of bulbs has a distribution that is close to Normal.
(d) the mean burnout time for a large number of bulbs has a distribution of the same shape (strongly skewed) as the distribution for individual bulbs.
(e) the mean burnout time for a large number of bulbs has a distribution that is close to Normal.

_____3)

You take an SRS of size 500 from the 37,000 students at Purdue University and measure individual's heights. You then take an SRS of size 500 from the 4,400,000 adults in the state of Indiana and measure their heights. Assuming the standard deviation of individual heights in the two populations is the same, the standard deviation of the sampling distribution of mean heights for the Indiana sample is

(a) approximately the same as for the Purdue sample because both are samples of size 500.
(b) smaller than for the Purdue sample because the population of Indiana is much larger.
(c) larger than for the Purdue sample because the population of Indiana is much larger.
(d) larger, because the Indiana sample is smaller relative to the population from which it's been taken.
(e) either larger or smaller than for the Purdue sample because it varies from sample to sample.

_____4)

The chipmunk population in a certain area is known to have a mean weight of 84 gm and a standard deviation of 18 gm. A wildlife biologist weighs 9 chipmunks that have been caught in live traps before releasing them. Which of the following best describes what we know about the sampling distribution of means for the biologist's sample? [Assume the 9 chipmunks represent a simple random sample of chipmunks in the area.]

(a) $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 18$; distribution approximately Normal

(b) $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 6$; shape of distribution unknown

(c) $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 6$; distribution approximately Normal

(d) $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}}$ unknown; distribution approximately Normal

(d) $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}}$ unknown; shape of distribution unknown

_____5)

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 with a mean of 62.5 mm and a standard deviation of 6 mm. Suppose you take a simple random sample of 5 adult males. What is the probability that their mean IPD is greater than 60 mm?

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

(d) $P\left(z < \frac{60-62.5}{\frac{6}{\sqrt{5}}}\right)$ (e) $P\left(z > \frac{62.5-60}{\frac{6}{\sqrt{5}}}\right)$

_____6)

In order to use the formula $\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$ to calculate the standard deviation of the sampling distribution of the sample proportion, which of the following conditions must be met?

I. $np \geq 10$ and $n(1-p) \geq 10$

II. The population's distribution is approximately Normal.

III. The sample size is less than 10% of the population size.

(a) I only
(b) II only
(c) III only
(d) I and III
(e) All three conditions must be met.

7)
A certain beverage company is suspected of underfilling its cans of soft drink. The company advertises that its cans contain, on average, 12 ounces of soda with standard deviation 0.4 ounce. For the questions that follow, suppose that the company is telling the truth.

(a) Can you calculate the probability that a single randomly selected can contains 11.9 ounces or less? If so, do it. If not, explain why you cannot.

(b) A quality control inspector measures the contents of an SRS of 50 cans of the company's soda and calculates the sample mean $\bar{x}$. What are the mean and standard deviation of the sampling distribution of $\bar{x}$ for samples of size $n = 50$?

(c) The inspector in part (b) obtains a sample mean of $\bar{x} = 11.9$ ounces. Calculate the probability that a random sample of 50 cans produces a sample mean amount of 11.9 ounces or less. Be sure to explain why you can use a Normal calculation.

(d) What would you conclude about whether the company is underfilling its cans of soda? Justify your answer.

8)

An opinion poll asks a sample of 500 adults (an SRS) whether they favor giving parents of school-age children vouchers that can be exchanged for education at any public or private school of their choice. Each school would be paid by the government on the basis of how many vouchers it collected. Suppose that in fact 45% of the population favor this idea.

(a) What is the mean of the sampling distribution of $\hat{p}$, the proportion of adults in samples of 500 who favor giving parents of school-age children these vouchers?

(b) What is the standard deviation of $\hat{p}$?

(c) Check that you can use the Normal approximation for the distribution of $\hat{p}$.

(d) What is the probability that more than half of the sample are in favor? Show your work.