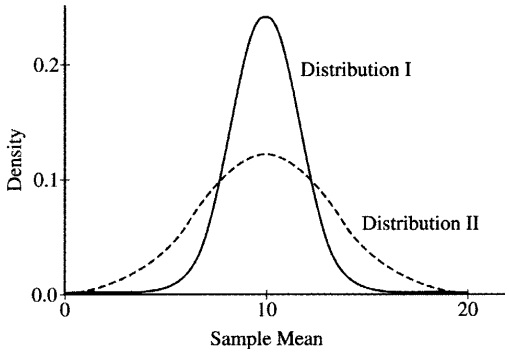
AP Statistics Name _____

Review Ch. 7 #3

1. The population {2, 3, 5, 7} has mean $\mu = 4.25$ and standard deviation $\sigma = 1.92$. When sampling with replacement, there are 16 different possible ordered samples of size 2 that can be selected from this population. The mean of each of these 16 samples is computed. For example, 1 of the 16 samples is (2, 5), which has a mean of 3.5. The distribution of the 16 sample means has its own mean $\mu_{\bar{x}}$ and its own standard deviation $\sigma_{\bar{x}}$. Which of the following statements is tree?

(A) $\mu_{\bar{x}} = 4.25$ and $\sigma_{\bar{x}} = 1.92$
(B) $\mu_{\bar{x}} = 4.25$ and $\sigma_{\bar{x}} > 1.92$
(C) $\mu_{\bar{x}} = 4.25$ and $\sigma_{\bar{x}} < 1.92$
(D) $\mu_{\bar{x}} > 4.25$
(E) $\mu_{\bar{x}} < 4.25$

2. The graphs of the sampling distributions, I and II, of the sample mean of the same random variable for samples of two different sizes are shown below. Which of the following statements must be true about the sample sizes?



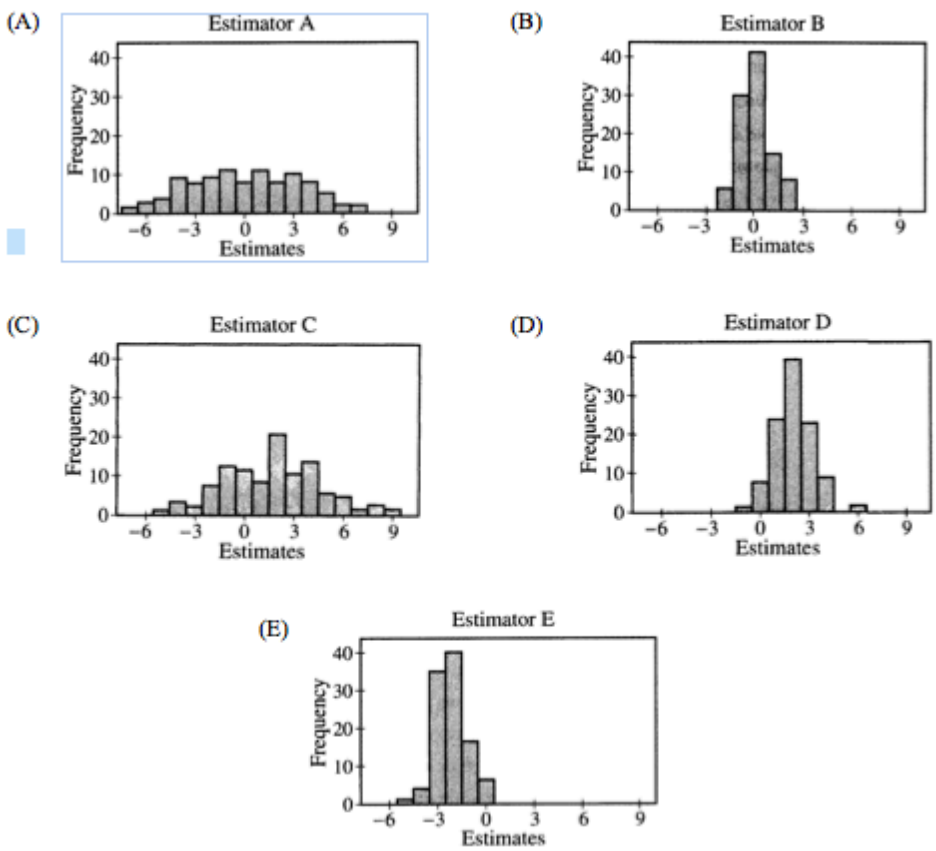
(A) The sample size of I is less than the sample size of II.
(B) The sample size of I is greater than the sample size of II.
(C) The sample size of I is equal to the sample size of II.
(D) The sample size does not affect the sampling distribution.
(E) The sample sizes cannot be compared based on these graphs.

3. A recent survey concluded that the proportion of American teenagers who have a cell phone is 0.27. The true population proportion of American teenagers who have a cell phone is 0.29. For samples of size 1,000 that are selected at random from this population, what are the mean and standard deviation, respectively, for the sampling distribution of the sample proportion of American teenagers who have a cell phone?

(A) $0.27, \sqrt{1000(0.27)(0.73)}$ (B) $0.27, \sqrt{\frac{(0.29)(0.71)}{1000}}$ (C) $0.27, \sqrt{\frac{(0.27)(0.73)}{1000}}$

(D) $0.29, \sqrt{\frac{(0.29)(0.71)}{1000}}$ (E) $0.29, \sqrt{1000(0.29)(0.71)}$

4. Five estimators for a parameter are being evaluated. The true value of the parameter is 0. Simulations of 100 random samples, each of size n, are drawn from the population. For each simulated sample, the five estimates are computed. The histograms below display the simulated sampling distributions for the five estimators. Which simulated sampling distribution is associated with the best estimator for this parameter?



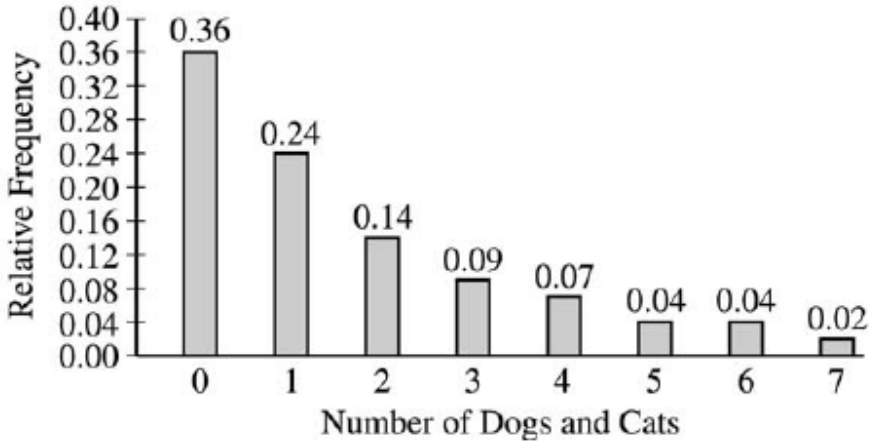
5. A recent study was conducted to investigate the duration of time required to complete a certain manual dexterity task. The reported mean was 10.2 seconds with a standard deviation of 16.0 seconds. Suppose the reported values are the true mean and standard deviation for the population of subjects in the study. If a random sample of 144 subjects is selected from the population, what is the approximate probability that the mean of the sample will be more than 11.0 seconds?

(A) 0.1151 (B) 0.2743 (C) 0.7257 (D) 0.8849
(E) Based on the values of the true mean and true standard deviation, it can be concluded that the population distribution is not normal and therefore the probability cannot be calculated.

6. There were 5,317 previously owned homes sold in a western city in the year 2000. The distribution of the sales prices of these homes was strongly right-skewed, with a mean of $206,274 and a standard deviation of $37,881.
If all possible simple random samples of size 100 are drawn from this population and the mean is computed for each of these samples, which of the following describes the sampling distribution of the sample mean?

(A) Approximately normal with mean $206,274 and standard deviation $3,788
(B) Approximately normal with mean $206,274 and standard deviation $37,881
(C) Approximately normal with mean $206,274 and standard deviation $520
(D) Strongly right-skewed with mean $206,274 and standard deviation $3,788
(E) Strongly right-skewed with mean $206,274 and standard deviation $37,881

7. The graph below displays the relative frequency distribution of X, the total number of dogs and cats owned per household, for the households in a large suburban area. For instance, 14 percent of the households own 2 of these pets.



The mean and standard deviation of X are 1.65 and 1.851, respectively. Suppose 150 households in this area are to be selected at random and $\bar{X}$, the mean number of dogs and cats per household is to be computed. Describe the sampling distribution of $\bar{X}$, including its shape, center and spread.

Answers

1. C
2. B
3. D
4. B
5. B
6. A

7.

The distribution of $\overline{X}$ will:

1. be approximately normal;
2. have mean $\mu_{\overline{X}} = \mu = 1.65$;
3. have standard deviation $\sigma_{\overline{X}} = \frac{\sigma}{\sqrt{n}} = \frac{1.851}{\sqrt{150}} = 0.1511$.