

AP Stats  
Ch. 7 MC Practice

Name: \_\_\_\_\_

1. A newspaper poll reported that 73% of respondents liked business tycoon Donald Trump. The number 73% is
- (a) a population.      (b) a parameter.      (c) a sample.  
(d) a statistic.      (e) an unbiased estimator.
2. The name for the pattern of values that a statistic takes when we sample repeatedly from the same population is
- (a) the bias of the statistic.      (b) the variability of the statistic.      (c) the population distribution.  
(d) the distribution of sample data.      (e) the sampling distribution of the statistic.
3. If we take a simple random sample of size  $n = 500$  from a population of size 5,000,000, the variability of our estimate will be
- (a) much less than the variability for a sample of size  $n = 500$  from a population of size 50,000,000.  
(b) slightly less than the variability for a sample of size  $n = 500$  from a population of size 50,000,000.  
(c) about the same as the variability for a sample of size  $n = 500$  from a population of size 50,000,000.  
(d) slightly greater than the variability for a sample of size  $n = 500$  from a population of size 50,000,000.  
(e) much greater than the variability for a sample of size  $n = 500$  from a population of size 50,000,000.
4. Increasing the sample size of an opinion poll will
- (a) reduce the bias of the poll result.      (b) reduce the variability of the poll result.  
(c) reduce the effect of nonresponse on the poll.      (d) reduce the variability of opinions.  
(e) all of the above.

Select the best answer for Exercises 5 to 8, which refer to the following setting. The magazine Sports Illustrated asked a random sample of 750 Division I college athletes, "Do you believe performance-enhancing drugs are a problem in college sports?" Suppose that 30% of all Division I athletes think that these drugs are a problem. Let  $\hat{p}$  be the sample proportion who say that these drugs are a problem.

5. The sampling distribution of  $\hat{p}$  has mean
- (a) 225      (b) 0.30.      (c) 0.017.      (d) 0.      (e) none of these.
6. The standard deviation of the sampling distribution is about
- (a) 0.0006      (b) 0.033.      (c) 0.017.      (d) 1.      (e) none of these.
7. Decreasing the sample size from 750 to 375 would multiply the standard deviation by
- (a) 2.      (b)  $\sqrt{2}$       (c)  $1/2$ .      (d)  $1/\sqrt{2}$       (e) none of these.

8. The sampling distribution of  $\hat{p}$  is approximately Normal because

- (a) there are at least 7570 Division I college athletes.      (b)  $np = 225$  and  $n(1 - p) = 525$ .  
(c) a random sample was chosen.      (d) a large sample size like  $n = 750$  guarantees it.  
(e) the sampling distribution of  $\hat{p}$  always has this shape.

Exercises 9 and 10 refer to the following setting. Scores on the mathematics part of the SAT exam in a recent year were roughly Normal with mean 515 and standard deviation 114. You choose an SRS of 100 students and average their SAT Math scores. Suppose that you do this many, many times.

9. The mean of the average scores you get should be close to

- (a) 515.      (b)  $515/100 = 5.15$ .      (c)  $515/\sqrt{100} = 51.5$       (d) 0.      (e) none of these.

10. The standard deviation of the average scores you get should be close to

- (a) 114.      (b)  $114/100 = 1.14$ .      (c)  $114/\sqrt{100} = 11.4$       (d) 1.      (e) none of these.

11. A newborn baby has extremely low birth weight (ELBW) if it weighs less than 1000 grams. A study of the health of such children in later years examined a random sample of 219 children. Their mean weight at birth was  $X = 810$  grams. This sample mean is an unbiased estimator of the mean weight  $\mu$  in the population of all ELBW babies, which means that

- (a) in all possible samples of size 219 from this population, the mean of the values of  $X$  will equal 810.  
(b) in all possible samples of size 219 from this population, the mean of the values of  $X$  will equal  $\mu$ .  
(c) as we take larger and larger samples from this population,  $X$  will get closer and closer to  $\mu$ .  
(d) in all possible samples of size 219 from this population, the values of  $X$  will have a distribution that is close to Normal.  
(e) the person measuring the children's weights does so without any systematic error.

12. 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 average burnout time gets ever closer to the mean  $\mu$  for all bulbs of this type.  
(b) the average burnout time of a large number of bulbs has a distribution of the same shape (strongly skewed) as the population distribution.  
(c) the average burnout time of a large number of bulbs has a distribution with similar shape but not as extreme (skewed, but not as strongly) as the population distribution.  
(d) the average burnout time of a large number of bulbs has a distribution that is close to Normal.  
(e) the average burnout time of a large number of bulbs has a distribution that is exactly Normal.

**13.** 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.

**14.** The Gallup Poll has decided to increase the size of its random sample of voters from about 1500 people to about 4000 people right before an election. The poll is designed to estimate the proportion of voters who favor a new law banning smoking in public buildings. The effect of this increase is to

- (a) reduce the bias of the estimate.                      (b) increase the bias of the estimate.  
(c) reduce the variability of the estimate.              (d) increase the variability of the estimate.  
(e) have no effect since the population size is the same.

**15.** Suppose we select an SRS of size  $n = 100$  from a large population having proportion  $p$  of successes. Let  $\hat{p}$  be the proportion of successes in the sample. For which value of  $p$  would it be safe to use the Normal approximation to the sampling distribution of  $\hat{p}$ ?

- (a) 0.01              (b) 1/11              (c) 0.85              (d) 0.975              (e) 0.999

**16.** 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 reasonably 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).

**17.** The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State University is approximately 40,000. At both schools, a simple random sample of about 3% of the undergraduates is taken. Each sample is used to estimate the proportion  $p$  of all students at that university who own an iPod. Suppose that, in fact,  $p = 0.80$  at both schools. Which of the following is the best conclusion?

- (a) The estimate from Johns Hopkins has less sampling variability than that from Ohio State.  
(b) The estimate from Johns Hopkins has more sampling variability than that from Ohio State.  
(c) The two estimates have about the same amount of sampling variability.  
(d) It is impossible to make any statement about the sampling variability of the two estimates since the students surveyed were different.  
(e) None of the above.

**18.** A researcher initially plans to take an SRS of size  $n$  from a population that has mean 80 and standard deviation 20. If he were to double his sample size (to  $2n$ ), the standard deviation of the sampling distribution of the sample mean would be multiplied by

- (a)  $\sqrt{2}$       (b)  $1/\sqrt{2}$       (c) 2.      (d)  $1/2$ .      (e)  $1/\sqrt{2n}$

**19.** The student newspaper at a large university asks an SRS of 250 undergraduates, "Do you favor eliminating the carnival from the term-end celebration?" All in all, 150 of the 250 are in favor. Suppose that (unknown to you) 55% of all undergraduates favor eliminating the carnival. If you took a very large number of SRSs of size  $n = 250$  from this population, the sampling distribution of the sample proportion  $\hat{p}$  would be

- (a) exactly Normal with mean 0.55 and standard deviation 0.03.  
(b) approximately Normal with mean 0.55 and standard deviation 0.03.  
(c) exactly Normal with mean 0.60 and standard deviation 0.03.  
(d) approximately Normal with mean 0.60 and standard deviation 0.03.  
(e) heavily skewed with mean 0.55 and standard deviation 0.03.

**20.** Which of the following statements about the sampling distribution of the sample mean is incorrect?

- (a) The standard deviation of the sampling distribution will decrease as the sample size increases.  
(b) The standard deviation of the sampling distribution is a measure of the variability of the sample mean among repeated samples.  
(c) The sample mean is an unbiased estimator of the true population mean.  
(d) The sampling distribution shows how the sample mean will vary in repeated samples.  
(e) The sampling distribution shows how the sample was distributed around the sample mean.

**21.** A machine is designed to fill 16-ounce bottles of shampoo. When the machine is working properly, the mean amount poured into the bottles is 16.05 ounces with a standard deviation of 0.1 ounce. Assume that the machine is working properly. If four bottles are randomly selected each hour and the number of ounces in each bottle is measured, then 95% of the observations should occur in which interval?

- (a) 16.05 to 16.15 ounces      (b)  $-0.30$  to  $+0.30$  ounces  
(c) 15.95 to 16.15 ounces      (d) 15.90 to 16.20 ounces      (e) None of the above

**22.** Suppose that you are a student aide in the library and agree to be paid according to the "random pay" system. Each week, the librarian flips a coin. If the coin comes up heads, your pay for the week is \$80. If it comes up tails, your pay for the week is \$40. You work for the library for 100 weeks. Suppose we choose an SRS of 2 weeks and calculate your average earnings  $X$ . The shape of the sampling distribution of  $X$  will be

- (a) Normal.      (b) approximately Normal.      (c) right-skewed.  
(d) left-skewed.      (e) symmetric but not Normal.