

## AP Statistics Practice Multiple Choice

1. A large simple random sample of people aged nineteen to thirty living in the state of Colorado was surveyed to determine which of two MP3 players just developed by a new company was preferred. To which of the following populations can the results of this survey be safely generalized?
  - (A) Only people aged nineteen to thirty living in the state of Colorado who were in this survey
  - (B) Only people aged nineteen to thirty living in the state of Colorado
  - (C) All people living in the state of Colorado
  - (D) Only people aged nineteen to thirty living in the United States
  - (E) All people living in the United States
2. The probability of obtaining a head when a certain coin is flipped is about 0.65. Which of the following is closest to the probability that heads would be obtained 15 or fewer times when this coin is flipped 25 times?
  - (A) 0.14
  - (B) 0.37
  - (C) 0.39
  - (D) 0.60
  - (E) 0.65
3. The buyer for an electronics store wants to estimate the proportion of defective wireless game controllers in a shipment of 5,000 controllers from the store's primary supplier. The shipment consists of 200 boxes each containing 25 controllers. The buyer numbers the boxes from 1 to 200 and randomly selects six numbers in that range. She then opens the six boxes with the corresponding numbers, examines all 25 controllers in each of these boxes, and determines the proportion of the 150 controllers that are defective. What type of sample is this?
  - (A) Biased random sample
  - (B) Nonrandom sample
  - (C) Simple random sample
  - (D) Stratified random sample
  - (E) Cluster random sample
4. A distribution of test scores is not symmetric. Which of the following is the best estimate of the z-score of the third quartile?
  - (A) 0.67
  - (B) 0.75
  - (C) 1.00
  - (D) 1.41
  - (E) This z-score cannot be estimated from the estimated information given.
5. Publishers of a magazine wish to determine what proportion of the magazine's 50,000 subscribers are pleased with their subscription. The publishers intend to mail a survey to 1,000 subscribers randomly selected from those who have received the magazine for 5 years or more. This introduces selection bias, since long-subscribing customers are more likely to be pleased with their subscription. Which of the following would best eliminate selection bias?
  - (A) Mail surveys to 2,000 subscribers randomly selected from those who have received the magazine for 5 years or more.
  - (B) Mail surveys to 1,000 subscribers randomly selected from those who have received the magazine for 1 year or less.
  - (C) Mail surveys to 1,000 subscribers randomly selected from all subscribers.
  - (D) Mail surveys to 1,000 subscribers randomly selected from those who have received the magazine for 5 years or more and 1,000 subscribers randomly selected from those who have received the magazine for 1 year or less.
  - (E) Mail surveys to 500 subscribers randomly selected from a group who have received a free six-month subscription within the past year.
6. An environmental scientist wants to test the null hypothesis that an antipollution device for cars is not effective. Under which of the following conditions would a Type 1 error be committed?
  - (A) The scientist concludes that the antipollution device is effective when it actually is not.
  - (B) The scientist concludes that the antipollution device is not effective when it actually is.
  - (C) The scientist concludes that the antipollution device is effective when it actually is.
  - (D) The scientist concludes that the antipollution device is not effective when it actually is not.
  - (E) A type 1 error cannot be committed in this situation.
7. Based on a random sample of 50 students, the 90 percent confidence interval for the mean amount of money students spend on lunch at a certain high school is found to be (\$3.45, \$4.15). Which of the following statements is true?
  - (A) 90% of the time, the mean amount of money that all students spend on lunch at this high school will be between \$3.45 and \$4.15.
  - (B) 90% of all students spend between \$3.45 and \$4.15 on lunch at this high school.

- (C) 90% of all random samples of 50 students obtained at this high school would result in a sample mean amount of money students spend on lunch between \$3.45 and \$4.15  
 (D) 90% of all random samples of 50 students obtained at this high school would result in 90% confidence interval that contains the true mean amount of money students spend on lunch.  
 (E) Approximately 45 of 50 students in the random sample will spend between \$3.45 and \$4.15 on lunch at this high school.

8. The National Honor Society at Central High School plans to sample a random group of 100 seniors from all high schools in the state in which Central High School is located to determine the average number of hours per week spent on homework. A 95% confidence interval for the mean number of hours spent on homework will then be constructed using the sample data. Before selecting the sample, the National Honor Society decides that it wants to decrease the margin of error. Which of the following is the best way to decrease the margin of error?

- (A) Increase the confidence level to 99% (B) Use the population standard deviation  
 (C) Use the sample standard deviation (D) Increase the sample size  
 (E) Decrease the sample size

9. Ninety percent of the people who have a particular disease will have a positive result on a given diagnostic test. Ninety percent of the people who do not have the disease will have a negative result on this test. If 5 percent of a certain population has the disease, what percent of that population would test positive for the disease?

- (A) 4.5 % (B) 5% (C) 10% (D) 14% (E) 90%

10. A marketing company wants to estimate the proportion of consumers in a certain region of the country who would react favorably to a new marketing campaign. Further, the company wants the estimate to have a margin of error of no more than 5 percent with 90 percent confidence. Of the following, which is closest to the minimum number of consumers needed to obtain the estimate with the desired precision?

- (A) 136 (B) 271 (C) 385 (D) 542 (E) 769

11. Each person in a random sample of adults indicated his or her favorite color. The results, shown in the table below, are reported by age group of the respondents.

	Red	Green	Blue	Other	Total
Under 30	20	42	16	36	114
30-50	24	35	24	25	108
Over 50	25	22	35	10	92
Total	69	99	75	71	314

If choice of color is independent of age group, which of the following expressions is equal to the expected number of respondents who are aged 30 to 50, inclusive, and prefer green?

- (A)  $\frac{(99)(108)}{314}$  (B)  $\frac{(69)(108)}{314}$  (C)  $\frac{(99)(35)}{108}$  (D)  $\frac{(35)(108)}{314}$  (E)  $\frac{(99)(35)}{314}$

12. A new restaurant is interested in determining the best time-temperature combination for roasting a five-pound cut of lamb. The times to be tested are 45 minutes, 60 minutes, and 90 minutes at temperatures of 350 degrees Fahrenheit and 425 degrees Fahrenheit for each time, with the exception of the 90 minute-425 degree combination. That combination is being eliminated because it will overcook the lamb, which leaves five combinations remaining. From 10 identical cuts of lamb, 2 are randomly selected to roast using each of the time-temperature combinations in the same oven. The quality of the finished product is evaluated for each roast. Which of the following is true?

- (A) The explanatory variable is the quality of the finished lamb  
 (B) The response variable is the roasting temperature for the lamb.  
 (C) If the experiment is repeated, identical results will be expected.  
 (D) There should be a control group (i.e., a group in which no treatment is given.)  
 (E) The two cuts that are being roasted for each time-temperature combination are an example of replication.

13. The director of a fitness center wants to examine the effects of two exercise classes (spinning and aerobics) on body fat percentage. A six-week spinning class and a six-week aerobics class are offered at the same time and on the same days, so that a person can enroll in only one of them. A new class of each is about to begin, and each is measured at the beginning and again at the end of the six-week class. Using the change in body fat percentage as the response variable and conducting a test at the  $\alpha = 0.01$  level, the director determines that there is a significant difference between the treatment means. Which of the following is a confounding variable in the study?

- (A) The director's choice of spinning and aerobics classes as the types for the use in the study
- (B) The random sample of 10 people from each class
- (C) The participants' choice of which class to take
- (D) The use of body fat percentage as the measure of effectiveness of the treatment
- (E) The fact that both classes were conducted three times each week at the same time of the day and for the same amount of time each day

14. 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.

15. On their birthdays, employees at a large company are permitted to take a 60 minute lunch break instead of the usual 30 minutes. Data were obtained from 10 randomly selected company employees on the amount of time that each actually took for lunch on his or her birthday. The company wishes to investigate whether these data provide convincing evidence that the meant time is greater than 60 minutes. Of the following, which information would NOT be expected to be a part of the process of correctly conducting a hypothesis test to investigate the question, at the 0.05 level of significance?

- (A) Being willing to assume that the distribution of actual birthday lunch times for all employees at the company is approximately normal
- (B) Knowing that there are no outliers in the data as indicated by the normal probability plot and box plot
- (C) Using a  $t$ -statistic to carry out the test
- (D) Given that the  $p$ -value is greater than 0.05, rejecting the null hypothesis and concluding that the mean time was NOT greater than 60 minutes.
- (E) Given that the  $p$ -value is greater than 0.05, rejecting the null hypothesis and concluding that the mean time was not greater than 60 minutes.

16. A dog food company wishes to test a new high-protein formula for puppy food to determine whether it promotes faster weight gain than the existing formula for that puppy food. Puppies participating in an experiment will be weighed at weaning (when they begin to eat puppy food) and will be weighed at one-month intervals for one year. In designing this experiment, the investigators wish to reduce the variability due to natural differences in puppy growth rates. Which of the following strategies is most appropriate for accomplishing this?

- (A) Block on dog breed and randomly assign puppies to existing and new formula groups within each breed.
- (B) Block on geographic location and randomly assign puppies to existing and new formula groups within each geographic area.
- (C) Stratify on dog breeds and randomly sample puppies within each breed. Then assign puppies by breed to either the existing or the new formula.
- (D) Stratify on geographic location of the puppies and randomly sample puppies within each geographic area. Then assign puppies by geographic area to either the existing or the new formula.
- (E) Stratify on gender and randomly sample puppies within gender groups. Then assign puppies by gender to either the existing or the new formula.