**Scenario 6-8**

Let the random variable $X$ represent the profit made on a randomly selected day by a certain store. Assume $X$ is Normal with a mean of $360 and standard deviation $50.

**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

1. Use Scenario 6-8. The probability is approximately 0.6 that on a randomly selected day the store will make less than which of the following amounts?
   A. $330.00
   B. $347.40
   C. $361.30
   D. $372.60
   E. $390.00

2. Use Scenario 6-8. The value of $P(X > $400)$ is
   A. 0.2881.
   B. 0.8450.
   C. 0.7881.
   D. 0.2119.
   E. 0.1600.

3. If the heights of 99.7% of American men are between 5’0” and 7’0”, what is your estimate of the standard deviation of the height of American men?
   A. 1”
   B. 3”
   C. 4”
   D. 6”
   E. 12”

4. A data set is Normally distributed with a mean of 25 and a standard deviation of 8. If you calculate the standard score of every observation in this data set, the resulting scores will have a distribution that has
   A. a mean of 100 and a standard deviation of 10.
   B. a mean of 25 and a standard deviation of 10.
   C. a mean of 25 and a standard deviation of 1.
   D. a mean of 1 and a standard deviation of 1.
   E. a mean of 0 and a standard deviation of 1.

5. Jack and Jill are both enthusiastic players of a certain computer game. Over the past year, Jack’s mean score when playing the game is 12,400 with a standard deviation of 1500. During the same period, Jill’s mean score is 14,200, with a standard deviation of 2000. They devise a fair contest: each one will play the game once, and they will compare $z$-scores. Jack gets a score of 14,000, and Jill gets a score of 16,000. Who won the contest, and what were each of their $z$-scores?
   A. Jack’s $z = 1.07;$ Jill’s $z = 1.11;$ Jill wins the contest
   B. Jack’s $z = 1.07;$ Jill’s $z = 0.90;$ Jack wins the contest
   C. Jack’s $z = 0.94;$ Jill’s $z = 1.11;$ Jill wins the contest
   D. Jack’s $z = 0.94;$ Jill’s $z = 0.90;$ Jack wins the contest
   E. Jack’s $z = 0.81;$ Jill’s $z = 0.99;$ Jill wins the contest
Scenario 6-15
Suppose that 40% of the cars in a certain town are white. A person stands at an intersection waiting for a white car. Let \( X \) = the number of cars that must drive by until a white one drives by.

6. Use Scenario 6-15. \( P(X < 5) = \)
   A. 0.0518
   B. 0.1296
   C. 0.2592
   D. 0.8704
   E. 0.9482

7. The distribution of household incomes in a small town is strongly skewed to the right. The mean income is $42,000 and the standard deviation is $24,000. The Ames family’s household income is $60,000. The \( z \)-score for the Ames family’s income is
   A. –0.75
   B. 0.3
   C. 0.75
   D. 0.86
   E. None of these, because \( z \)-score cannot be used unless the distribution is Normal.

8. When a basketball player makes a pass to a teammate who then scores, he earns an “assist.” Below is a Normal probability plot for the number of assists earned by all players in the National Basketball Association during the 2010 regular season.

Which of the following statements about the shape of this distribution is true?
   A. The distribution is Normal.
   B. The distribution is approximately Normal.
   C. The distribution is roughly symmetric.
   D. The distribution has no potential outliers.
   E. The distribution is skewed.

9. The 35th percentile of a population is the number \( x \) such that
   A. 35% of the population scores are above \( x \).
   B. 65% of the population scores are above \( x \).
   C. 35% of the population scores equal \( x \).
   D. \( x \) is 35% of the population median.
   E. \( x \) is 35% of the population mean.
10. A college basketball player makes $\frac{5}{6}$ of his free throws. Assuming free throw attempts are independent, the probability that he makes exactly three of his next four free throws is
A. $4 \left( \frac{1}{6} \right)^3 \left( \frac{5}{6} \right)^1$.
B. $\left( \frac{1}{6} \right)^3 \left( \frac{5}{6} \right)^1$.
C. $3 \left( \frac{1}{6} \right)^1 \left( \frac{5}{6} \right)^3$.
D. $\left( \frac{1}{6} \right)^1 \left( \frac{5}{6} \right)^3$.
E. $4 \left( \frac{1}{6} \right)^1 \left( \frac{5}{6} \right)^3$.

11. If 30 is added to every number on a list, the only one of the following that is not changed is
A. the mean.
B. the mode.
C. the 75th percentile.
D. the median.
E. the standard deviation.

12. A small class has 10 students. Five of the students are male and five are female. I write the name of each student on a 3-by-5 card. The cards are shuffled thoroughly and I draw cards, one at a time, until I get a card with the name of a male student. Let $X$ be the number of cards I draw. The random variable $X$ has which of the following probability distributions?
A. A binomial distribution with mean 5.
B. A binomial distribution with mean 10.
C. The geometric distribution with probability of success 0.1.
D. The geometric distribution with probability of success 0.5.
E. None of the above.

13. To pass the time, a toll booth collector counts the number of cars that pass through his booth until he encounters a driver with red hair. Suppose we define the random variable $Y$ = the number of cars the collector counts until he gets a red-headed driver for the first time. Is $Y$ a geometric random variable?
A. Yes – all conditions for the geometric setting are met.
B. No – “red-headed driver” and “non-red-headed driver” are not the same as “success” and “failure”.
C. No – we can’t assume that each “trial” (that is, each car) is independent of previous trials.
D. No – the number of trials is not fixed.
E. No – the probability of a driver being red-headed is not the same for each trial.

14. The scores on a university examination are Normally distributed with a mean of 62 and a standard deviation of 11. If the bottom 5% of students will fail the course, what is the lowest mark that a student can have and still be awarded a passing grade?
A. 40
B. 43
C. 44
D. 57
15. Birthweights at a local hospital have a Normal distribution with a mean of 110 oz. and a standard deviation of 15 oz. The proportion of infants with birthweights between 125 oz. and 140 oz. is about
A. 0.136.
B. 0.270.
C. 0.477.
D. 0.636.
E. 0.819.

16. The binomial expression \( \binom{8}{2} \left( \frac{1}{3} \right)^2 \left( \frac{2}{3} \right)^6 \) gives the probability of
A. at least 2 successes in 8 trials if the probability of success in one trial is 1/3.
B. at least 2 successes in 8 trials if the probability of success in one trial is 2/3.
C. exactly 2 successes in 8 trials if the probability of success in one trial is 1/3.
D. exactly 2 successes in 8 trials if the probability of success in one trial is 2/3.
E. at least 6 successes in 8 trials if the probability of success in one trial is 2/3.

Scenario 6-14
A worn out bottling machine does not properly apply caps to 5% of the bottles it fills.

17. Use Scenario 6-14. If you randomly select 20 bottles from those produced by this machine, what is the approximate probability that exactly 2 caps have been improperly applied?
A. 0.0002
B. 0.19
C. 0.74
D. 0.81
E. 0.92

18. Using the standard Normal distribution tables, the area under the standard Normal curve corresponding to \( Z < 1.1 \) is
A. 0.1357.
B. 0.2704.
C. 0.8413.
D. 0.8438.
E. 0.8643.

19. Using the standard Normal distribution tables, the area under the standard Normal curve corresponding to \( Z > -1.22 \) is
A. 0.1112.
B. 0.1151.
C. 0.4129.
D. 0.8849.
E. 0.8888.

20. For which of the following counts would a binomial probability model be reasonable?
A. The number of traffic tickets written by each police officer in a large city during one month.
B. The number of hearts in a hand of five cards dealt from a standard deck of 52 cards that has been thoroughly shuffled.
C. The number of 7’s in a randomly selected set of five random digits from a table of random
digits.
D. The number of phone calls received in a one-hour period.
E. All of the above.

21. Let $X$ denote the time taken for a computer link to be made between the terminal in an executive's office and the computer at a remote factory site. It is known that $X$ has a Normal distribution with a mean of 15 seconds and a standard deviation of 3 seconds. On 90% of the occasions the computer link is made in less than
A. 11.16 seconds.
B. 15.95 seconds.
C. 18.11 seconds.
D. 18.84 seconds.
E. 19.39 seconds.
MULTIPLE CHOICE

1. ANS: D  
   PTS: 1
2. ANS: D  
   PTS: 1
3. ANS: C  
   PTS: 1
4. ANS: E  
   PTS: 1
5. ANS: B  
   PTS: 1
6. ANS: D  
   PTS: 1
7. ANS: C  
   PTS: 1
8. ANS: E  
   PTS: 1
9. ANS: B  
   PTS: 1
10. ANS: E  
    PTS: 1
11. ANS: E  
    PTS: 1
12. ANS: E  
    PTS: 1
13. ANS: A  
    PTS: 1
14. ANS: C  
    PTS: 1
15. ANS: A  
    PTS: 1
16. ANS: C  
    PTS: 1
17. ANS: B  
    PTS: 1
18. ANS: E  
    PTS: 1
19. ANS: E  
    PTS: 1
20. ANS: C  
    PTS: 1
21. ANS: D  
    PTS: 1