1. The formula $E(X) = np$ can be used to find the expected value of
   a. any numeric random variable
   b. only Poisson random variables
   c. only normal random variables
   d. only binomial random variables  *
   e. none of the above

2. For a specific sample size, the width of a 95% confidence interval on $\mu$
   a. would be larger than the width of a 90% confidence interval on $\mu$.  *
   b. would be smaller than the width of a 90% confidence interval on $\mu$.
   c. would be the same as the width of a 90% confidence interval on $\mu$.
   d. cannot be compared to the width of a 90% confidence interval on $\mu$.
   e. none of the above

3. A random sample of 400 WVU students was selected, in which 150 students stated that they had used “an illegal drug”. A 95% confidence interval on binomial parameter $p$ goes from 33.5% to 41.5%. Which of the following statements provides the appropriate interpretation of this 95% confidence interval?
   a. 95% of all WVU students use an illegal drug between 33.5% and 41.5% of the time.
   b. There is a 95% probability that a randomly selected WVU student has used an illegal drug.
   c. We are 95% confident that between 33.5% and 41.5% of all WVU students have used an illegal drug.  *
   d. We are 95% confident that between 33.5% and 41.5% of the sample of 400 WVU students have used an illegal drug.
   e. none of the above

4. The standard normal distribution is a normal distribution whose
   a. mean is $\mu=1$ and standard deviation $\sigma=0$
   b. mean is $\mu=0$ and standard deviation $\sigma=1$  *
   c. mean $\mu$ can have any real value and standard deviation $\sigma=1$
   d. mean $\mu$ can be determined by using a z-score
   e. none of the above

5. A radar gun is used to measure the speed of 74 randomly selected automobiles on Interstate 79, and the data is used to construct a 95% confidence interval on the mean
speed of all automobiles on I-79. The 95% confidence interval goes from 64.4 mph to 71.6 mph. Which of the following statements provides the appropriate interpretation of this 95% confidence interval?

a. 95% of all automobiles on I-79 travel between 64.4 mph and 71.6 mph.
b. There is a 95% probability that the mean speed of all automobiles on I-79 is between 64.4 mph and 71.6 mph.
c. We are 95% confident that the mean speed of all automobiles on I-79 is between 64.4 mph and 71.6 mph. *
d. There is a 5% probability that the mean speed of all automobiles on I-79 is between 64.4 mph and 71.6 mph.
e. none of the above

6. Scores on the math section of a college entrance exam are normally distributed with mean \( \mu = 22.4 \) and standard deviation \( \sigma = 3.1 \). Find the probability that a randomly selected test-taker will score 25 or higher on the math section of this exam.

a. 0.7995
b. 0.2005 *
c. 0.8387
d. 0.1613
e. none of the above

7. Every normal distribution

a. is symmetric about its mean \( \mu = 0 \)
b. is symmetric about its mean \( \mu \), but the mean is not necessarily 0 *
c. is asymmetric
d. parts b) and c) only
e. none of the above

8. On a multiple-choice exam, there are 5 possible answers to each of 20 questions. Each question has only one correct answer. A student, “J”, has not studied and must guess the answer to each question (you may assume that the guesses are independent of each other). The mean number of correct guesses that “J” can expect to obtain is

a. 5
b. 10
c. 4 *
d. 2
e. none of the above

9. A random sample of 400 WVU Stat211 students was selected, in which 72 students stated that they did not attend their statistics lab session last week. A 99% confidence interval on \( p \), the probability that a randomly selected WVU Stat211 student did not attend his/her statistics lab session last week
a. has lower limit 0.142 and upper limit 0.218
b. has lower limit 0.148 and upper limit 0.211
c. has lower limit 0.130 and upper limit 0.230 *
d. cannot be computed using the information provided
e. is none of the above

10. Twenty-three percent of college freshmen do not return to college for their sophomore year of study. A random sample of 12 college freshmen is obtained. The probability that exactly four of the 12 freshmen will not return for their sophomore year is
   a. 0.1712 *
   b. 0.0010
   c. 0.8424
d. 0.1936
e. none of the above

11. A random sample consisting of 64 observations is collected from a population with mean 75 and standard deviation 32. The probability that the sample mean will have value that is less than 83 is
   a. not computable given the information provided
   b. 0.5987
c. 0.0228
d. 0.9772 *
e. none of the above

12. Before we use the Poisson distribution to approximate a binomial probability, we must
   a. make sure that the original experiment is a binomial experiment
   b. check that the (three) conditions for using the Poisson approximation are satisfied
c. set \( \lambda = np \)
d. all of the above *
e. parts b) and c) only

13. Vendco Company owns a soda pop vending machine in the lobby of their office building. For a random sample of 14 days during the year 2004, data was collected on the number of cans of soda pop sold each day. The sample mean was 65.2 cans with a sample deviation of 8.1 cans. Construct a 95% confidence interval on the mean number of can sold per day during 2004.
   a. The 95% confidence interval goes from 60.96 to 69.44 cans per day.
   b. The 95% confidence interval goes from 60.52 to 69.88 cans per day. *
   c. The 95% confidence interval goes from 61.64 to 68.76 cans per day.
d. The 95% confidence interval cannot be calculated because the sample size is less than 30 observations.
e. The 95% confidence interval goes from 57.10 to 73.30 cans per day.

14. Assume that the amount of time PRT riders spend waiting for a PRT car is normally distributed with a mean $\mu = 14.8$ minutes and standard deviation $\sigma = 2.9$ minutes. Find the probability that a randomly selected PRT rider must wait less than 18 minutes for the next PRT car.
   a. 1.1034
   b. 0.1100
   c. 0.8643 *
   d. 0.1357
   e. none of the above

15. An individual measurement, i.e., a data value, consists of which three components:
   a. the sample, the observational unit, and the researcher
   b. the true value, the bias, and chance (or random) error *
   c. the population, the sample, and the sample mean
   d. the population mean, the sample mean, and the sample standard deviation
   e. none of the above

16. A random sample of 10 observations is selected from a normal distribution with population mean equal to 75 and a population standard deviation equal to 20. The mean of $x$-bar’s distribution (i.e., the sampling distribution of the sample mean)
   a. cannot be determined from the information provided
   b. will be equal to 75 *
   c. will be equal to 20
   d. will be equal to 7.5
   e. none of the above

17. Dr. Digme, an archaeologist, estimates that, on the average, she recovers one significant historical artifact per fifty cubic yards of dirt that she excavates. During the summer of 2007 Dr. Digme plans to excavate 100 cubic yards of dirt. The probability that Dr. Digme will recover at least 3 significant historical artifacts is
   a. 0.677
   b. 0.323 *
   c. 0.080
   d. 0.019
   e. none of the above
18. Hot Head Hat Company specializes in custom printing on hats. Hot Head Hat Company averages two custom orders per week. The probability that this company receives exactly 3 custom hat orders next week is
   a. 0.180 *
   b. 0.820
   c. 0.857
   d. 0.143
   e. none of the above

19. On a multiple-choice exam, there are 5 possible answers to each of 20 questions. Each question has only one correct answer. A student, “J”, has not studied and must guess the answer to each question (you may assume that the guesses are independent of each other). “J” must answer at least 10 questions correctly in order to pass the exam. The probability that “J” will pass the exam is
   a. 0.0011
   b. 0.9994
   c. 0.0026 *
   d. 0.0006
   e. none of the above

20. The probability distribution for a single toss of a fair tetrahedral (four-sided) die is

<table>
<thead>
<tr>
<th>X</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(X)</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
</tbody>
</table>

   The expected value of X is
   a. 1
   b. 2
   c. 3
   d. 4
   e. none of the above *

21. A sample survey
   a. attempts to acquire data from every member of a population
   b. attempts to acquire data from a subset of a population *
   c. is the same as a sampling frame
   d. is the same as a census
   e. none of the above

22. A simple random sample
   a. is obtained in such a way as to ensure that every member of the population has
      an equal chance of being selected
b. usually requires that a sampling frame be constructed
c. usually results in a sample that is representative of the population from which
   the sample was selected
d. all of the above *
e. none of the above

23. The cumulative binomial probability P(X ≤ 4) corresponds to
   a. the probability of getting exactly 4 successes in our binomial experiment
   b. the probability of getting fewer than 4 successes in our binomial experiment
   c. the probability of getting no more than 4 successes in our binomial experiment*
   d. the probability of not getting exactly 4 successes in our binomial experiment
   e. none of the above

24. Which of the following would result in an increase in the width of a confidence
    interval?
   a) An increase in n
   b) A decrease in the standard error
   c) A decrease in the confidence level
   d) A decrease in the sample mean
   e) None of the above would cause an increase in the width of a confidence
      interval *

25. The Heart Association claims that 90% of adults over 25 years of age cannot meet the
    requirements of the President’s Commission on Physical Fitness. A random sample of
    400 adults is selected. Find the probability that at least 50 of these 400 adults meet the
    requirements of the President’s Commission on Physical Fitness.
   a. 0.1583
   b. 0.8417
   c. 0.9429
   d. 0.0571  *
   e. none of the above