Identify the given random variable as being discrete or continuous.

1) The number of oil spills occurring off the Alaskan coast
   A) Continuous  B) Discrete

2) The pH level in a shampoo
   A) Discrete  B) Continuous

3) The number of field goals kicked in a football game
   A) Discrete  B) Continuous

Determine whether the following is a probability distribution. If not, identify the requirement that is not satisfied.

4) 
   \[
   \begin{array}{c|c}
   x & P(x) \\
   \hline
   1 & 0.037 \\
   2 & 0.200 \\
   3 & 0.444 \\
   4 & 0.296 \\
   \end{array}
   \]

5) 
   \[
   \begin{array}{c|c}
   x & P(x) \\
   \hline
   0 & 0.290 \\
   1 & 0.278 \\
   2 & -0.047 \\
   3 & 0.063 \\
   4 & 0.292 \\
   5 & 0.124 \\
   \end{array}
   \]

Find the mean of the given probability distribution.

6) 
   \[
   \begin{array}{c|c}
   x & P(x) \\
   \hline
   0 & 0.42 \\
   1 & 0.12 \\
   2 & 0.34 \\
   3 & 0.05 \\
   4 & 0.07 \\
   \end{array}
   \]

   A) \( \mu = 1.13 \)  B) \( \mu = 1.65 \)  C) \( \mu = 1.55 \)  D) \( \mu = 1.23 \)

7) A police department reports that the probabilities that 0, 1, 2, and 3 burglaries will be reported in a given day are 0.53, 0.43, 0.03, and 0.01, respectively.
   \[
   \begin{array}{c|c}
   \hline
   \end{array}
   \]
   A) \( \mu = 0.52 \)  B) \( \mu = 1.05 \)  C) \( \mu = 0.25 \)  D) \( \mu = 1.50 \)
Provide an appropriate response. Round to the nearest hundredth.

8) Find the standard deviation for the given probability distribution.

\[
\begin{array}{c|c}
 x & P(x) \\
0 & 0.12 \\
1 & 0.07 \\
2 & 0.21 \\
3 & 0.30 \\
4 & 0.30 \\
\end{array}
\]

A) \( \sigma = 1.30 \)  
B) \( \sigma = 1.70 \)  
C) \( \sigma = 1.35 \)  
D) \( \sigma = 2.90 \)

9) A police department reports that the probabilities that 0, 1, 2, and 3 burglaries will be reported in a given day are 0.49, 0.39, 0.08, and 0.04, respectively. Find the standard deviation for the probability distribution. Round answer to the nearest hundredth.

A) \( \sigma = 0.79 \)  
B) \( \sigma = 0.62 \)  
C) \( \sigma = 1.05 \)  
D) \( \sigma = 1.03 \)

Answer the question.

10) Focus groups of 11 people are randomly selected to discuss products of the Yummy Company. It is determined that the mean number (per group) who recognize the Yummy brand name is 7.8, and the standard deviation is 0.97. Would it be unusual to randomly select 11 people and find that fewer than 4 recognize the Yummy brand name?

A) Yes  
B) No

11) Assume that there is a 0.15 probability that a basketball playoff series will last four games, a 0.30 probability that it will last five games, a 0.25 probability that it will last six games, and a 0.30 probability that it will last seven games. Is it unusual for a team to win a series in 5 games?

A) Yes  
B) No

12) Suppose that weight of adolescents is being studied by a health organization and that the accompanying tables describes the probability distribution for three randomly selected adolescents, where \( x \) is the number who are considered morbidly obese. Is it unusual to have no obese subjects among three randomly selected adolescents?

\[
\begin{array}{c|c}
 x & P(x) \\
0 & 0.111 \\
1 & 0.215 \\
2 & 0.450 \\
3 & 0.224 \\
\end{array}
\]

A) Yes  
B) No

13) Suppose that voting in municipal elections is being studied and that the accompanying tables describes the probability distribution for four randomly selected people, where \( x \) is the number that voted in the last election. Is it unusual to find four voters among four randomly selected people?

\[
\begin{array}{c|c}
 x & P(x) \\
0 & 0.23 \\
1 & 0.32 \\
2 & 0.26 \\
3 & 0.15 \\
4 & 0.04 \\
\end{array}
\]

A) Yes  
B) No
Assume that a researcher randomly selects 14 newborn babies and counts the number of girls selected, x. The probabilities corresponding to the 14 possible values of x are summarized in the given table. Answer the question using the table.

<table>
<thead>
<tr>
<th>x(girls)</th>
<th>P(x)</th>
<th>x(girls)</th>
<th>P(x)</th>
<th>x(girls)</th>
<th>P(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>5</td>
<td>0.122</td>
<td>10</td>
<td>0.061</td>
</tr>
<tr>
<td>1</td>
<td>0.001</td>
<td>6</td>
<td>0.183</td>
<td>11</td>
<td>0.022</td>
</tr>
<tr>
<td>2</td>
<td>0.006</td>
<td>7</td>
<td>0.209</td>
<td>12</td>
<td>0.006</td>
</tr>
<tr>
<td>3</td>
<td>0.022</td>
<td>8</td>
<td>0.183</td>
<td>13</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.061</td>
<td>9</td>
<td>0.122</td>
<td>14</td>
<td>0.000</td>
</tr>
</tbody>
</table>

14) Find the probability of selecting exactly 5 girls.  
   A) 0.122  B) 0.061  C) 0.001  D) 0.022

15) Find the probability of selecting 12 or more girls.  
   A) 0.001  B) 0.007  C) 0.006  D) 0.022

Provide an appropriate response.

16) Let the random variable x represent the number of tails in five flips of a coin. Construct a table describing the probability distribution, then find the mean and standard deviation.

17) In a game, you have a 1/36 probability of winning $94 and a 35/36 probability of losing $8. What is your expected value?  
   A) $10.39  B) -$7.78  C) -$5.17  D) $2.61

18) Suppose you buy 1 ticket for $1 out of a lottery of 1,000 tickets where the prize for the one winning ticket is to be $500. What is your expected value?  
   A) $0.00  B) -$1.00  C) -$0.50  D) -$0.40

19) A 28-year-old man pays $165 for a one-year life insurance policy with coverage of $140,000. If the probability that he will live through the year is 0.9994, what is the expected value for the insurance policy?  
   A) -$164.90  B) $139,916.00  C) -$81.00  D) $84.00

Determine whether the given procedure results in a binomial distribution. If not, state the reason why.

20) Rolling a single die 57 times, keeping track of the numbers that are rolled.  
   A) Not binomial: there are too many trials.  
   B) Procedure results in a binomial distribution.  
   C) Not binomial: there are more than two outcomes for each trial.  
   D) Not binomial: the trials are not independent.

21) Rolling a single "loaded" die 50 times, keeping track of the "fives" rolled.  
   A) Not binomial: the trials are not independent.  
   B) Not binomial: there are more than two outcomes for each trial.  
   C) Procedure results in a binomial distribution.  
   D) Not binomial: there are too many trials.
Assume that a procedure yields a binomial distribution with a trial repeated \( n \) times. Use the binomial probability formula to find the probability of \( x \) successes given the probability \( p \) of success on a single trial. Round to three decimal places.

22) \( n = 10, x = 2, p = \frac{1}{3} \)
A) 0.193  
B) 0.195  
C) 0.003  
D) 0.216

23) \( n = 12, x = 5, p = 0.25 \)
A) 0.082  
B) 0.027  
C) 0.103  
D) 0.091

Find the indicated probability. Round to three decimal places.

24) A test consists of 10 true/false questions. To pass the test a student must answer at least 6 questions correctly. If a student guesses on each question, what is the probability that the student will pass the test?
A) 0.172  
B) 0.828  
C) 0.205  
D) 0.377

25) A machine has 12 identical components which function independently. The probability that a component will fail is 0.2. The machine will stop working if more than three components fail. Find the probability that the machine will be working.
A) 0.133  
B) 0.927  
C) 0.795  
D) 0.206

26) In a certain college, 33% of the physics majors belong to ethnic minorities. If 10 students are selected at random from the physics majors, that is the probability that no more than 6 belong to an ethnic minority?
A) 0.055  
B) 0.985  
C) 0.913  
D) 0.982

27) An airline estimates that 97% of people booked on their flights actually show up. If the airline books 70 people on a flight for which the maximum number is 68, what is the probability that the number of people who show up will exceed the capacity of the plane?
A) 0.375  
B) 0.649  
C) 0.257  
D) 0.119

Find the indicated probability.

28) An archer is able to hit the bull’s-eye 53% of the time. If she shoots 10 arrows, what is the probability that she gets exactly 4 bull’s-eyes? Assume each shot is independent of the others.
A) 0.000851  
B) 0.0789  
C) 0.179  
D) 0.0905

29) A multiple choice test has 7 questions each of which has 4 possible answers, only one of which is correct. If Judy, who forgot to study for the test, guesses on all questions, what is the probability that she will answer exactly 3 questions correctly?
A) 0.311  
B) 0.827  
C) 0.0156  
D) 0.173

Find the mean, \( \mu \), for the binomial distribution which has the stated values of \( n \) and \( p \). Round answer to the nearest tenth.

30) \( n = 44; p = 0.2 \)
A) \( \mu = 9.1 \)  
B) \( \mu = 9.5 \)  
C) \( \mu = 8.3 \)  
D) \( \mu = 8.8 \)

Find the standard deviation, \( \sigma \), for the binomial distribution which has the stated values of \( n \) and \( p \). Round your answer to the nearest hundredth.

31) \( n = 21; p = 0.2 \)
A) \( \sigma = 1.83 \)  
B) \( \sigma = 5.95 \)  
C) \( \sigma = -0.58 \)  
D) \( \sigma = 5.10 \)
32) \( n = 38; p = 3/5 \)
   A) \( \sigma = 3.02 \) \hspace{1cm} B) \( \sigma = 6.29 \) \hspace{1cm} C) \( \sigma = 7.14 \) \hspace{1cm} D) \( \sigma = 0.61 \)

Use the given values of \( n \) and \( p \) to find the minimum usual value \( \mu - 2\sigma \) and the maximum usual value \( \mu + 2\sigma \). Round your answer to the nearest hundredth unless otherwise noted.

33) \( n = 108, p = 0.24 \)
   A) Minimum: -13.48; maximum: 65.32 \hspace{1cm} B) Minimum: 34.8; maximum: 17.04
   C) Minimum: 21.48; maximum: 30.36 \hspace{1cm} D) Minimum: 17.04; maximum: 34.8

34) \( n = 261, p = \frac{1}{5} \)
   A) Minimum: 45.74; maximum: 58.66 \hspace{1cm} B) Minimum: 65.12; maximum: 39.28
   C) Minimum: 39.28; maximum: 65.12 \hspace{1cm} D) Minimum: 43.06; maximum: 61.34

Solve the problem.

35) According to a college survey, 22% of all students work full time. Find the mean for the number of students who work full time in samples of size 16.
   A) 2.8 \hspace{1cm} B) 0.2 \hspace{1cm} C) 3.5 \hspace{1cm} D) 4.0

36) According to a college survey, 22% of all students work full time. Find the standard deviation for the number of students who work full time in samples of size 16.
   A) 1.9 \hspace{1cm} B) 1.7 \hspace{1cm} C) 2.6 \hspace{1cm} D) 3.5

37) In a certain town, 42% of voters favor a given ballot measure. For groups of 30 voters, find the variance for the number who favor the measure.
   A) 2.7 \hspace{1cm} B) 12.6 \hspace{1cm} C) 7.3 \hspace{1cm} D) 53.4

Determine if the outcome is unusual. Consider as unusual any result that differs from the mean by more than 2 standard deviations. That is, unusual values are either less than \( \mu - 2\sigma \) or greater than \( \mu + 2\sigma \).

38) The Acme Candy Company claims that 60% of the jawbreakers it produces weigh more than .4 ounces. Suppose that 800 jawbreakers are selected at random from the production lines. Would it be unusual for this sample of 800 to contain 529 jawbreakers that weigh more than .4 ounces?
   A) Yes \hspace{1cm} B) No

39) According to AccuData Media Research, 36% of televisions within the Chicago city limits are tuned to "Eyewitness News" at 5:00 pm on Sunday nights. At 5:00 pm on a given Sunday, 2500 such televisions are randomly selected and checked to determine what is being watched. Would it be unusual to find that 898 of the 2500 televisions are tuned to "Eyewitness News"?
   A) Yes \hspace{1cm} B) No
Answer Key
Testname: CH5PRAC

1) B
2) B
3) A
4) Not a probability distribution. The sum of the P(x)’s is not 1, since 0.977 ≠ 1.000.
5) Not a probability distribution. One of the P(x)’s is negative.
6) D
7) A
8) A
9) A
10) A
11) B
12) B
13) A
14) A
15) B
16) x | P(x)
   0 | 0.03125
   1 | 0.15625
   2 | 0.31250
   3 | 0.31250
   4 | 0.15625
   5 | 0.03125
   μ = 2.5000
   σ = 1.1180
17) C
18) C
19) C
20) C
21) C
22) B
23) C
24) D
25) C
26) D
27) A
28) C
29) D
30) D
31) A
32) A
33) D
34) C
35) C
36) B
37) C
38) A
39) B