MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question.

1) Which of the following cannot be a probability?
   A) \( \frac{3}{5} \)      B) \( \frac{2}{3} \)      C) \( \frac{1}{2} \)      D) \( \frac{5}{3} \)
   1) \( \text{D} \)

Find the indicated probability.

2) A sample space consists of 13 separate events that are equally likely. What is the probability of each?
   A) 0      B) \( \frac{1}{13} \)      C) 13      D) 1
   2) \( \text{B} \)

3) A die with 12 sides is rolled. What is the probability of rolling a number less than 11?
   A) 10      B) \( \frac{1}{12} \)      C) \( \frac{5}{6} \)      D) \( \frac{11}{12} \)
   3) \( \text{C} \)

4) In a poll, respondents were asked whether they had ever been in a car accident. 196 respondents indicated that they had been in a car accident and 118 respondents said that they had not been in a car accident. If one of these respondents is randomly selected, what is the probability of getting someone who has been in a car accident? Round to the nearest thousandth, if necessary.
   A) 1.661      B) 0.624      C) 0.376      D) 0.005
   4) \( \text{B} \)

Answer the question.

5) In a certain town, 10% of people commute to work by bicycle. If a person is selected randomly from the town, what are the odds against selecting someone who commutes by bicycle?
   A) 9 : 1      B) 9 : 10      C) 1 : 9      D) 1 : 10
   5) \( \text{A} \)

Find the indicated probability.

6) Based on meteorological records, the probability that it will snow in a certain town on January 1st is 0.206. Find the probability that in a given year it will not snow on January 1st in that town.
   A) 1.206      B) 0.259      C) 0.794      D) 4.854
   6) \( \text{C} \)
7) The table below describes the smoking habits of a group of asthma sufferers.

<table>
<thead>
<tr>
<th></th>
<th>Nonsmoker</th>
<th>Occasional smoker</th>
<th>Regular smoker</th>
<th>Heavy smoker</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>433</td>
<td>42</td>
<td>71</td>
<td>37</td>
<td>583</td>
</tr>
<tr>
<td>Women</td>
<td>326</td>
<td>47</td>
<td>78</td>
<td>39</td>
<td>490</td>
</tr>
<tr>
<td>Total</td>
<td>759</td>
<td>89</td>
<td>149</td>
<td>76</td>
<td>1073</td>
</tr>
</tbody>
</table>

If one of the 1073 people is randomly selected, find the probability that the person is a man or a heavy smoker.

A) 0.545 \hspace{1cm} B) 0.614 \hspace{1cm} C) 0.580 \hspace{1cm} D) 0.487

\[ P(\text{Man} \cup \text{Heavy Smoker}) = \frac{583}{1073} + \frac{37}{1073} = 0.580 \]

8) A card is drawn from a well-shuffled deck of 52 cards. Find \( P(\text{drawing an ace or a 9}) \). A playing card deck has 52 cards with 4 suits.

A) \( \frac{7}{26} \) \hspace{1cm} B) 7 \hspace{1cm} C) \( \frac{2}{13} \) \hspace{1cm} D) \( \frac{13}{2} \)

\[ P(\text{Ace or 9}) = P(\text{Ace} \cup 9) = \frac{4}{52} + \frac{4}{52} = \frac{2}{13} \]

9) 100 employees of a company are asked how they get to work and whether they work full time or part time. The figure below shows the results. If one of the 100 employees is randomly selected, find the probability that the person drives alone or cycles to work.

\[
P(\text{Driver alone} \cup \text{Cycles to work}) = \frac{(28+29)}{100} + \frac{(3+4)}{100} = \frac{64}{100} = 0.64
\]

1. Public transportation: 10 full time, 9 part time
2. Bicycle: 3 full time, 4 part time
3. Drive alone: 28 full time, 29 part time
4. Carpool: 9 full time, 8 part time

A) 0.64 \hspace{1cm} B) 0.31 \hspace{1cm} C) 0.60 \hspace{1cm} D) 0.57

10) An unprepared student makes random guesses for the ten true–false questions on a quiz. Find the probability that there is at least one correct answer.

A) \( \frac{1}{1024} \) \hspace{1cm} B) \( \frac{1023}{1024} \) \hspace{1cm} C) \( \frac{1}{10} \) \hspace{1cm} D) \( \frac{9}{10} \)

\[ P(\text{at least one correct}) = 1 - P(\text{all incorrect}) = 1 - \frac{1}{2^{10}} = 1 - \frac{1}{1024} = \frac{1023}{1024} \]
Evaluate the expression.

11) \(8^4 \choose 4 = \) \(1680\)

A) 70  
B) 1680  
C) 2  
D) 4  

12) \(10^2 \choose 2 = \) \(45\)

A) 45  
B) 5  
C) 80,640  
D) 40,320

Solve the problem.

13) There are 8 members on a board of directors. If they must form a subcommittee of 5 members, how many different subcommittees are possible?

A) 120  
B) 56  
C) 6720  
D) 32,768

\[ \text{Total No. of subcommittees} = \binom{8}{5} = 56 \]

14) How many 5-digit numbers can be formed using the digits 1, 2, 3, 4, 5, 6, 7 if repetition of digits is not allowed?

A) 16,807  
B) 119  
C) 120  
D) 2520

\[ \text{Total No. of 5 digit numbers with no repetition} = 7^5 = 2520 \]

15) There are 7 members on a board of directors. If they must elect a chairperson, a secretary, and a treasurer, how many different slates of candidates are possible?

A) 210  
B) 35  
C) 343  
D) 5040

\[ \text{Total No. of different slates of candidates} = 7^3 = 210 \]

Identify the given random variable as being discrete or continuous.

16) The number of oil spills occurring off the Alaskan coast

A) Discrete  
B) Continuous

17) The braking time of a car

A) Discrete  
B) Continuous
Solve the problem.

18) Find the variance for the given probability distribution.

<table>
<thead>
<tr>
<th>x</th>
<th>P(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.17</td>
</tr>
<tr>
<td>1</td>
<td>0.28</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
</tr>
<tr>
<td>3</td>
<td>0.15</td>
</tr>
<tr>
<td>4</td>
<td>0.35</td>
</tr>
</tbody>
</table>

\[ \sum = 1.568 \]

\[ \text{Variance} = \sigma^2 = 1.568^2 = 2.459 \]

\[ \approx 2.46 \]

A) 2.63  B) 2.69  C) 2.46  D) 7.43

Find the indicated probability.

19) An airline estimates that 98% of people booked on their flights actually show up. If the airline books 76 people on a flight for which the maximum number is 74, what is the probability that the number of people who show up will exceed the capacity of the plane?

\[ P(\text{Exceeding the Capacity of the plane}) = P(x > 74) = P(75) + P(76) \]

This is Binomial Dist.

\[ = \text{binompdf}(76, 0.98, 75) + P(76) \]

\[ = 0.5499 \]

A) 0.3340  B) 0.2154  C) 0.5494  D) 0.8051

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.

20) \( n = 2661; \ p = 0.63 \)

A) \( \sigma = 22.50 \)  B) \( \sigma = 28.18 \)  C) \( \sigma = 24.91 \)  D) \( \sigma = 29.03 \)

\[ \sigma = \sqrt{np(1-p)} = \sqrt{2661 \times 0.63 \times 0.37} \]

\[ = 24.91 \approx 24.91 \]

Solve the problem.

21) 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) $-0.50  B) $-0.40  C) $-1.00  D) $0.00

\[ \text{Lose} \times P(x) \]

\[ = -1 \times \frac{999}{1000} \quad \Rightarrow \quad E(x) = \text{Expected Value} = \mu \]

\[ = - \frac{999}{1000} + \frac{500}{1000} \]

\[ \approx -0.494 \]

21) A

Answer the question.

22) Suppose you are playing a game of chance. If you bet $7 on a certain event, you will collect $280 (including your $7 bet) if you win. Find the odds used for determining the payoff.

A) 89 : 1  B) 1 : 39  C) 40 : 1  D) 280 : 287

\[ \text{Net} = 280 - 7 = 273 \]

\[ \text{Payoff} \text{ over ale} = 273 : 7 = 39 : 1 \]
If $Z$ is a standard normal variable, find the probability.

23) The probability that $Z$ is less than 1.13

A) 0.1292  
B) 0.8708  
C) 0.8907  
D) 0.8485

$$P(Z < 1.13) = P(Z \leq 1.13)$$

= normalcdf\((-\infty, 1.13)\)

= 0.8708

Using the following uniform density curve, answer the question.

24) What is the probability that the random variable has a value greater than 5.3?

A) 0.2875  
B) 0.3375  
C) 0.2125  
D) 0.4625

$$P(x > 5.3) = P(X > 5.3) = \left(8 - 5.3\right) \times \frac{1}{8}$$

= 0.3375