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

Use an Euler diagram to determine whether the argument is valid or invalid.

1) All wrestlers are strong.
   Some wrestlers are smart.
   Therefore, some strong people are smart.
   A) valid B) invalid

2) All dogs are animals.
   Some animals are pets.
   Therefore, some dogs are pets.
   A) valid B) invalid

3) Some cars are considered sporty.
   Some cars are safe at high speeds.
   Therefore, some sports cars are safe at high speeds.
   A) valid B) invalid

Use the formula for \( nP_r \) to solve.

4) A club elects a president, vice-president, and secretary-treasurer. How many sets of officers are possible if there are 9 members and any member can be elected to each position? No person can hold more than one office.
   A) 168 B) 252 C) 3024 D) 504

Use a truth table to determine whether the symbolic form of the argument is valid or invalid.

5) \( \neg q \land \neg p \)
   \( P \lor \neg q \)
   \( \therefore \neg q \)
   A) Valid B) Invalid

6) \( p \rightarrow q \)
   \( \neg p \)
   \( \therefore \neg q \)
   A) Valid B) Invalid

Use a truth table to determine whether the two statements are equivalent.

7) \( q \rightarrow p \) and \( \neg q \lor p \)
   A) Yes B) No

A single die is rolled twice. The set of 36 equally likely outcomes is \{ (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6) \}.

8) Find the probability of getting a sum of 4 or 5.
   A) \( \frac{1}{12} \) B) \( \frac{1}{9} \) C) \( \frac{2}{9} \) D) \( \frac{7}{36} \)
Use the formula for \( \binom{n}{r} \) to evaluate the expression.

9) In how many ways can a committee of three men and four women be formed from a group of 11 men and 11 women? 
   A) 7,840,800  
   B) 54,450  
   C) 554,400  
   D) 110

Write the nonequivalent converse and inverse of the statement.

10) If you are sleeping, then you are not studying.
   A) converse: If you are not sleeping, then you are studying
   inverse: If you are not studying, then you are sleeping.
   B) converse: If you are studying, then you are not sleeping.
   inverse: If you are not sleeping, then you are studying.
   C) converse: If you are not studying, then you are sleeping.
   inverse: If you are sleeping, then you are not studying.
   D) converse: If you are not studying, then you are sleeping.
   inverse: If you are not sleeping, then you are studying.

Solve the problem by applying the Fundamental Counting Principle with two groups of items.

11) An apartment complex offers apartments with four different options, designated by A through D.

   A = number of bedrooms (one through four)
   B = number of bathrooms (one through three)
   C = floor (first through fifth)
   D = outdoor additions (balcony or no balcony)

   How many apartment options are available?
   A) 16  
   B) 14  
   C) 240  
   D) 120

Solve the problem.

12) A committee consisting of 6 people is to be selected from eight parents and four teachers. Find the probability of selecting three parents and three teachers.
   A) \( \frac{100}{231} \)  
   B) \( \frac{10}{11} \)  
   C) \( \frac{8}{33} \)  
   D) \( \frac{2}{33} \)

13) Six students, A, B, C, D, E, F, are to give speeches to the class. The order of speaking is determined by random selection. Find the probability that (a) E will speak first (b) that C will speak fifth and B will speak last (c) that the students will speak in the following order: DECABF (d) that A or B will speak first.
   A) \( \frac{1}{6}; \frac{1}{12}; \frac{1}{720}; \frac{1}{3} \)  
   B) \( \frac{1}{6}; \frac{1}{36}; \frac{1}{720}; \frac{1}{12} \)  
   C) \( \frac{1}{6}; \frac{1}{24}; \frac{1}{720}; \frac{1}{3} \)  
   D) \( \frac{1}{6}; \frac{1}{36}; \frac{1}{360}; \frac{1}{3} \)

Write the equivalent contrapositive of the statement.

14) If a puzzle piece is missing, then I cannot finish the puzzle.
   A) If a puzzle piece is not missing, then I cannot finish the puzzle.
   B) If I cannot finish the puzzle, then a puzzle piece is missing.
   C) If I can finish the puzzle, then a puzzle piece is not missing.
   D) If a puzzle piece is not missing, then I can finish the puzzle.
Construct a truth table for the statement.

15) \( \sim(p \land q) \rightarrow \sim(p \lor q) \)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>( \sim(p \land q) \rightarrow \sim(p \lor q) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>F</td>
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<td></td>
<td>T</td>
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<td></td>
<td>F</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>T</td>
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<tr>
<td>B</td>
<td>T</td>
<td>T</td>
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<td></td>
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<td>T</td>
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<td></td>
<td>F</td>
<td>T</td>
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<td></td>
<td>F</td>
<td>T</td>
</tr>
</tbody>
</table>

The chart shows the probability of a certain disease for men by age. Use the information to solve the problem. Express all probabilities as decimals, estimated to two decimal places.

<table>
<thead>
<tr>
<th>Age</th>
<th>Probability of Disease X</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>less than 0.008</td>
</tr>
<tr>
<td>25-34</td>
<td>0.009</td>
</tr>
<tr>
<td>35-44</td>
<td>0.14</td>
</tr>
<tr>
<td>45-54</td>
<td>0.39</td>
</tr>
<tr>
<td>55-64</td>
<td>0.42</td>
</tr>
<tr>
<td>65-74</td>
<td>0.67</td>
</tr>
<tr>
<td>75+</td>
<td>0.79</td>
</tr>
</tbody>
</table>

16) What is the probability that a randomly selected man between the ages of 55 and 64 does not have this disease?

A) 0.42  B) 0.39  C) 0.58  D) 0.61

Use the theoretical probability formula to solve the problem. Express the probability as a fraction reduced to lowest terms.

17) Use the spinner below to answer the question. Assume that it is equally probable that the pointer will land on any one of the five numbered spaces. If the pointer lands on a borderline, spin again.

Find the probability that the arrow will land on an odd number.

A) \( \frac{2}{5} \)  B) \( \frac{3}{5} \)  C) 1  D) 0
The table shows the number of minority officers in the U.S. military in 2000.

<table>
<thead>
<tr>
<th></th>
<th>Army</th>
<th>Navy</th>
<th>Marines</th>
<th>Air Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Americans</td>
<td>9162</td>
<td>3524</td>
<td>1341</td>
<td>4282</td>
</tr>
<tr>
<td>Hispanic Americans</td>
<td>2105</td>
<td>2732</td>
<td>914</td>
<td>1518</td>
</tr>
<tr>
<td>Other Minorities</td>
<td>4075</td>
<td>2653</td>
<td>599</td>
<td>3823</td>
</tr>
</tbody>
</table>

Assume that one person will be randomly selected from the group described in the table.

18) Find the probability of selecting an officer who is in the Navy, given that the officer is African American.

A) \( \frac{3524}{8909} \)  
B) \( \frac{3542}{14785} \)  
C) \( \frac{3524}{18,309} \)  
D) \( \frac{8909}{18,309} \)

Solve the problem involving probabilities with independent events.

19) If you toss a fair coin 9 times, what is the probability of getting all heads?

A) \( \frac{1}{1024} \)  
B) \( \frac{1}{2} \)  
C) \( \frac{1}{256} \)  
D) \( \frac{1}{512} \)

Solve the problem that involves probabilities with events that are not mutually exclusive.

20) In a class of 50 students, 24 are Democrats, 17 are business majors, and 3 of the business majors are Democrats. If one student is randomly selected from the class, find the probability of choosing a Democrat or a business major.

A) \( \frac{19}{25} \)  
B) \( \frac{7}{25} \)  
C) \( \frac{41}{50} \)  
D) \( \frac{22}{25} \)
Testname: EXAM2

1) A
2) B
3) B
4) D
5) A
6) B
7) A
8) D
9) B
10) D
11) D
12) C
13) C
14) C
15) C
16) C
17) B
18) C
19) D
20) A
Name___________________________________

1) ______
2) ______
3) ______
4) ______
5) ______
6) ______
7) ______
8) ______
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10) ______
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12) ______
13) ______
14) ______
15) ______
16) ______
17) ______
18) ______
19) ______
20) ______