Pre-test worksheet 5  AP Statistics  Name:

Part 1: Multiple Choice. Circle the letter corresponding to the best answer.

1. A fair coin is tossed four times, and each time the coin lands heads up. If the coin is then tossed 1996 more times, how many heads are most likely to appear in these 1996 additional tosses?
   (a) 996  
   (b) 998  
   (c) 1000  
   (d) 1002  
   (e) 1996

2. Dwayne has collected data on the number of occupants of cars travelling on the road past his house for the past week. Based on his data, he has constructed a probability model for the number of occupants of a randomly-selected car on his street. Which of the following could be his model?
   (a)  
   (b)  
   (c)  
   (d)  
   (e) 

<table>
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<tr>
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<td>≥5</td>
<td>0.04</td>
<td>≥5</td>
<td>0.4</td>
<td>≥5</td>
<td>1/8</td>
<td>≥5</td>
<td>0.05</td>
</tr>
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</table>

Use the following for questions 3 – 5.

The two-way table below gives information on the performers in the New York Philharmonic Orchestra, categorized by section (type of instrument) and gender.

<table>
<thead>
<tr>
<th>Male</th>
<th>Strings</th>
<th>Woodwinds</th>
<th>Brass</th>
<th>Totals</th>
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<tr>
<td></td>
<td>24</td>
<td>8</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>6</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td>Totals</td>
<td>61</td>
<td>14</td>
<td>13</td>
<td>88</td>
</tr>
</tbody>
</table>

3. You select one musician from this group at random. What is the probability that this person plays a woodwind?
   (a) 0.091  
   (b) 0.136  
   (c) 0.159  
   (d) 0.182  
   (e) 0.571

4. You select one musician from this group at random. If the person is a male, what is the probability that he plays a woodwind?
   (a) 0.091  
   (b) 0.136  
   (c) 0.159  
   (d) 0.182  
   (e) 0.571

5. You select one musician from this group at random. Which of the following statement is true about the events “Plays a woodwind” and “Male?”
   (a) The events are mutually exclusive and independent.
   (b) The events are not mutually exclusive but they are independent.
   (c) The events are mutually exclusive, but they are not independent.
   (d) The events are not mutually exclusive, nor are they independent.
   (e) The events are independent, but we do not have enough information to determine if they are mutually exclusive.
6. A die is loaded so that the number 6 comes up three times as often as any other number. What is the probability of rolling a 1 or a 6?
   (a) $\frac{2}{3}$  (b) $\frac{1}{2}$  (c) $\frac{3}{8}$  (d) $\frac{1}{3}$  (e) $\frac{1}{4}$

7. You draw two marbles at random from a jar that has 20 red marbles and 30 black marbles without replacement. What is the probability that both marbles are red?
   (a) 0.1551  (b) 0.1600  (c) 0.2222  (d) 0.4444  (e) 0.8000

Use the following for questions 8 and 9:

An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1.

8. The conditional probability of A, given B
   (a) is 1/2.
   (b) is 3/10.
   (c) is 1/5.
   (d) is 1/6.
   (e) cannot be determined from the information given.

9. We may conclude that
   (a) events A and B are independent.
   (b) events A and B are mutually exclusive.
   (c) either A or B always occurs.
   (d) events A and B are complementary.
   (e) none of the above is correct.

10. If you buy one ticket in the Provincial Lottery, then the probability that you will win a prize is 0.11. Given the nature of lotteries, the probability of winning is independent from month to month. If you buy one ticket each month for five months, what is the probability that you will win at least one prize?
    (a) 0.55
    (b) 0.50
    (c) 0.44
    (d) 0.45
    (e) 0.56
Part 2: Free Response

Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

11. An airline estimates that the probability that a random call to their reservation phone line result in a reservation being made is 0.31. This can be expressed as \( P(\text{call results in reservation}) = 0.31 \). Assume each call is independent of other calls.

(a) Describe what the Law of Large Numbers says in the context of this probability.

(b) What is the probability that none of the next four calls results in a reservation?

(c) You want to estimate the probability that exactly one of the next four calls result in a reservation being made. Describe the design of a simulation to estimate this probability. Explain clearly how you will use the partial table of random digits below to carry out your simulation.

(d) Carry out 5 trials of your simulation. Mark on or above each line of the table so that someone can clearly follow your method.

| 188 | 87370 88099 89695 87633 76987 85503 26257 51736 |
| 189 | 88296 95670 74932 65317 93848 43988 47597 83044 |
| 190 | 79485 92200 99401 54473 34336 82786 05457 60343 |
| 191 | 40830 24979 23333 37619 56227 95941 59494 86539 |
| 192 | 32006 76302 81221 00693 95197 75044 46596 11628 |
12. A grocery store examines its shoppers’ product selection and calculates the following: The probability that a randomly-chosen shopper buys apples is 0.21, that the shopper buys potato chips is 0.36, and that the shopper buys both apples and potato chips is 0.09.

(a) Let \( A \) = Randomly-chosen shopper buys apples, and \( C \) = Randomly-chosen shopper buys potato chips. Sketch a Venn diagram or two-way table that summarizes the probabilities above.

(b) Find each of the following:

i. The probability that a randomly-selected shopper buys apples or potato chips.

ii. The probability that a randomly-selected shopper buys potato chips or doesn’t buy apples.

iii. The probability that a randomly-selected shopper doesn’t buy apples and doesn’t buy potato chips.

13. Wile E. Coyote is pursuing the Road Runner across Great Britain toward Scotland. The Road Runner chooses his route randomly, such that there is a probability of 0.8 that he’ll take the high road and 0.2 that he’ll take the low road. If he takes the high road, the probability that Wile E. catches him is 0.01. If he takes the low road, the probability he gets caught is 0.05. Find the probability that he took the high road, given that he was caught.