CONCEPTUAL PROBABILITY

1. Determine the following conditional probabilities.

   Consider a bag with marbles, 3 blue marbles, 2 red marbles, and 5 green marbles. Three marbles are drawn in sequence and are taken without replacement.

   i. \( P(2^{nd} \text{ draw: blue} \mid 1^{st} \text{ draw: red}) = \)  
   
   ii. \( P(2^{nd} \text{ draw: blue} \mid 1^{st} \text{ draw: blue}) = \)

   iii. \( P(3^{rd} \text{ draw: blue} \mid 1^{st} \text{ draw: red, 2^{nd} draw: blue}) = \)

2. Determine the following conditional probabilities.

   Consider drawing 1 card from a standard deck of shuffled cards:

   i. \( P(\text{Queen} \mid \text{Face Card}) = \)

   ii. \( P(\text{Ace} \mid \text{Lettered Card}) = \)

   iii. \( P(\text{Heart with a Number} \mid \text{Red Card}) = \)

   iv. \( P(\text{Card with a Letter} \mid \text{King}) = \)

   v. \( P(\text{number less than 6} \mid \text{Face Card}) = \)

   vi. \( P(\text{Odd Number} \mid \text{Numbered Card}) = \)

3. Consider the following table with information about all of the students taking Statistics at Phoenix High School.

<table>
<thead>
<tr>
<th></th>
<th>Full-time</th>
<th>Part-time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>28</td>
<td>15</td>
<td>43</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>16</td>
<td>28</td>
</tr>
</tbody>
</table>

   A. \( P(\text{Full-time} \mid \text{Male}) = \)
   
   B. \( P(\text{Male} \mid \text{Full-time}) = \)

   C. \( P(\text{Female} \mid \text{Part-time}) = \)

   D. \( P(\text{Full-time} \mid \text{Part-time}) = \)
4. Given the following VENN Diagram answer the following.

A. \( P( A \mid B ) = \) ___________

B. \( P( B \mid A ) = \) ___________

C. \( P( A \mid B' ) = \) ___________

D. \( P( B \mid A' ) = \) ___________

5. Given the \( P(B) = 0.6 \) and \( P(A \mid B) = 0.2 \), determine the \( P(A \text{ and } B) \).

6. Given the VENN Diagram and \( P(A) = 0.8 \) and \( P(B \mid A) = 0.3 \)

A. Determine the \( P(A \text{ and } B) \)

B. Determine the \( P(B) \)

C. Determine the \( P(B' \cap A) \)

D. Determine the \( P((A \cup B)') \)

7. Also, two events can be determined to be independent if \( P(A \mid B) = P(A) \) and \( P(B \mid A) = P(B) \). Can you explain why?