11.4 Conditional Probability

In some situations, the second event will be affected by the outcome of the first event. In this case, the probability of the second event must take into account the fact that the first event has already occurred.

Conditional Probability (dependent events)

\[ P(B \mid A) \] Represents the probability of event B occurring after it is assumed that event A has occurred.

The following formula presents to us, a way to find the probability of conditional events. However, when data are presented in a table, we have the option of using the table.

\[ P(B \mid A) = \frac{P(A \text{ and } B)}{P(A)} \]

**Example 1**

(a) Find the probability of selecting someone who is a man

(b) Find the probability of selecting someone who is a man given that he died.

(c) Find the probability of selecting someone who survived given that he is a man.

<table>
<thead>
<tr>
<th>Titanic Data</th>
<th>Men</th>
<th>Women</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survived</td>
<td>332</td>
<td>318</td>
<td>29</td>
<td>27</td>
</tr>
<tr>
<td>Died</td>
<td>1360</td>
<td>104</td>
<td>35</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>1692</td>
<td>422</td>
<td>64</td>
<td>45</td>
</tr>
</tbody>
</table>
Example 2
A sample of 500 respondents was selected in a large metropolitan area to study consumer behavior with the following results:

(a) Find the probability of selecting a
   (1) Male  (2) Female  (3) enjoy shopping

(b) Find the probability of selecting someone who is a male given that he enjoys shopping.

(c) Find the probability of selecting someone who does not enjoy shopping given that she is a female.

(d) Find the probability of selecting someone who enjoys shopping given that he is a male?

(e) Find the probability of selecting a male or someone who enjoys shopping?