5.2 Probability Rules

What is the probability of being a brown eyed female?

To answer today’s question we will randomly select 10 students to come up front. Use those students’ information to answer the following questions.

1. In any given class, there are males and females who have blue, brown or green eyes. Create a table that shows all possible combinations of these gender and eye colors.

2. Using the 10 students chosen, find each of the following probabilities:
   - \( P(\text{Male}) = \)
   - \( P(\text{Female}) = \)
   - \( P(\text{Blue Eyes}) = \)
   - \( P(\text{Brown Eyes}) = \)
   - \( P(\text{Green Eyes}) = \)

3. Find each of the following probabilities and explain why your answer makes sense.
   - \( P(\text{Male or Female}) = \)
   - \( P(\text{Blue or Brown Eyes}) = \)

4. Find each of the following probabilities and explain why your answer makes sense.
   - \( P(\text{Male or Blue Eyes}) = \)
   - \( P(\text{Female or Brown Eyes}) = \)

5. Find each of the following probabilities and explain why your answer makes sense.
   - \( P(\text{Not Green Eyes}) = \)
   - \( P(\text{Not Male}) = \)
Check Your Understanding:
What is the relationship between educational achievement and home ownership? A random sample of 500 U.S. adults was selected. Each member of the sample was identified as a high school graduate (or not) and as a homeowner (or not). The two-way table displays the data. Suppose we choose a member of the sample at random. Define events

G: person is a high school graduate
H: person is a homeowner.

<table>
<thead>
<tr>
<th></th>
<th>High school graduate</th>
<th>Not a high school graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeowner</td>
<td>221</td>
<td>119</td>
</tr>
<tr>
<td>Not a homeowner</td>
<td>89</td>
<td>71</td>
</tr>
</tbody>
</table>

1. Explain in plain language what \( P(G^c) \) means and find the probability.

2. Explain why \( P(G \cup H) \neq P(G) + P(H) \). Then find \( P(G \cup H) \).

3. Make a Venn diagram to the right to display the sample space of this chance process.

4. Write the event “is not a high school graduate but is a homeowner” in symbolic form and find the probability.