Consider the following example: we are rolling a fair 6-sided dice.

A = the outcome is even. \( \{2, 4, 6\} \)
B = the outcome is greater than 3. \( \{4, 5, 6\} \)

**Rule 1:** For any event A, \( 0 \leq P(A) \leq 1. \)

**Rule 2:** \( P(S) = 1. \)

**Rule 3:** If A is an event, then \( P(A') = 1 - P(A). \)

**Rule 4:** If A and B are any two events, then \( P(A \cup B) = P(A) + P(B) - P(A \cap B). \)

\[
P(A) = \frac{3}{6} = \frac{1}{2} \quad P(A') = 1 - P(A) = \frac{1}{2}
\]
\[
A' = \{1, 3, 5\} \quad P(A') = \frac{3}{6} = \frac{1}{2}
\]

**Rule 5 (Law of Total Probability):** \( P(A) = P(A \cap B) + P(A \cap B'). \)

\[
P(A \cap B) = \frac{1}{3} \quad B' = \{1, 2, 3\}
A \cap B' = \{2\} \quad P(A \cap B') = \frac{1}{6}
\]
\[
P(A \cap B) + P(A \cap B') = \frac{1}{3} + \frac{1}{6} = \frac{1}{2}
\]
Example 2:

The probability that Ha orders food delivery on a random day is 0.45. Also note that the probability that Ha does not leave the house on a random day is 0.8. The probability Ha both orders food delivery and does not leave the house is 0.35.

a) What is the probability that Ha does not order food delivery on a randomly selected day?

\[ P(A') = 1 - P(A) = 1 - 0.45 = 0.55 \]

b) What is the probability that on a randomly selected day, Ha orders food delivery or doesn’t leave the house or both?

\[ P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.45 + 0.8 - 0.35 = 0.9 \]

c) What is the probability Ha doesn’t order food delivery but leaves the house on a randomly selected day?

\[ P(A' \cap B) = 0.1 \]

To-do:

- Finish Lab 05, commit and push the lab using git commands!
- Finish HW 4 on PL!