

**PSTAT 5A: Discussion Worksheet 02***Spring 2023, with Ethan P. Marzban*

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1. Consider two events  $A$  and  $B$ . Express the following events using **only** these two events, along with unions, intersections, and complements. Additionally, for each part, sketch a Venn Diagram of the specified event.
  - (a) Both  $A$  and  $B$  occur.
  - (b) Either  $A$  or  $B$  occur.
  - (c) Neither  $A$  nor  $B$  occur.
  - (d) Either  $A$  or  $B$  occur, but not both.
  
2. Consider the experiment of tossing a fair coin and rolling a fair 6-sided die (and recording the outcome of both the coin flip and the die roll).
  - (a) Use a table to express the outcome space of this experiment.
  - (b) Use a tree diagram to express the outcome space of this experiment.
  - (c) Find the probability that the die lands on an even number.
  - (d) Find the probability that the coin lands on 'heads'.
  - (e) Find the probability that the die lands on an even number, or the coin lands 'heads'.
  
3. A jar contains 3 red candies, 4 blue candies, and 2 purple candies. Three candies are to be drawn at random, and their color is to be recorded. The order in which the colors appear is not important.
  - (a) How many elements are in the outcome space  $\Omega$  associated with this experiment?
  - (b) In how many outcomes do we observe exactly 3 red candies?
  - (c) In how many outcomes do we observe exactly 2 red candies and 1 purple candy?
  
4. Consider an outcome space  $\Omega = \{a, b, c\}$  for arbitrary elements  $a$ ,  $b$ , and  $c$ . Suppose that  $\mathbb{P}(\{a\}) = \mathbb{P}(\{b\})$ , and that  $\mathbb{P}(\{c\}) = 0.1$ . What is  $\mathbb{P}(\{a\})$ ? **Hint:** Recall the second axiom of probability; i.e. that  $\mathbb{P}(\Omega) = 1$ .