

MATH 262

Section 1.2

Day 2

1. For each of the following experiments, state the sample space and any three events.

(a) A coin is flipped until heads appears, and the number of flips is recorded.

(b) A real number is selected between 0 and 1.

2. Let A and B be some events in a sample space. Draw a Venn diagram to illustrate each of the following events:

$$(A \cap B)'$$

$$A' \cup B'$$

Discuss at your table: How do your diagrams illustrate one of De Morgan's Laws?

3. Write down probability Axiom 3. Let $A_i = \emptyset$ for all $i \in \{1, 2, 3, \dots\}$. At your table, explain why this implies $P(\emptyset) = 0$.

4. The **Complement Rule** says that for any event A , $P(A) = 1 - P(A')$. (This can be proved using Axiom 3.) Explain how the Complement Rule implies that $P(A) \leq 1$ for any event A .

5. If A and B are disjoint, Axiom 3 implies that $P(A \cup B) = P(A) + P(B)$. If A and B are *not* disjoint, what is the relationship between $P(A \cup B)$, $P(A \cap B)$, $P(A)$, and $P(B)$?

Hint: Use a Venn diagram.

6. Generalize your answer from #5 to three sets. That is, what can you say about $P(A \cup B \cup C)$?

★ **BONUS:** If $A \subseteq B$ (meaning that A is a subset of B), show that $P(A) \leq P(B)$.