2.1: Sample Spaces and Events

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Definitions

An **experiment** is any action or process whose outcome is subject to uncertainty.

The **sample space** of an experiment, $\mathcal{S}$, is the set of all possible outcomes

An **event** is any collection of outcomes of (a subset of) $\mathcal{S}$

An event is **simple** or **compound** if it consists of one outcome or more than one outcome, respectively.

Definitions

Making new events from old...

The **union** of events A and B, denoted $A \cup B$, is the event that consists of all that outcomes that are either in A or B or both (the inclusive or)

The **intersection** of events A and B, denoted $A \cap B$, is the event that consists of all the outcomes for which both A and B occur

The **complement** of an event A, denoted A', is the set of all outcomes in not in A (but are in the bigger space $\mathcal{S}$)

The **null set** or **empty set**, denoted $\varnothing$ is the set with nothing in it

Two sets A and B are **mutually exclusive** or **disjoint** if there is nothing in their intersection (i.e. $A \cap B = \varnothing$)

Some notation

We can intersect/union together more than two sets sets at a time

$$\bigcap_{i=1}^{20} A_i = A_1 \cap A_2 \cap \cdots \cap A_{19} \cap A_{20}$$

or

$$\bigcup_{i=1}^{\infty} A_i = A_1 \cup A_2 \cup \cdots$$

Some useful stuff

Also

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

$$(A \cap B)' = A' \cup B'$$

$$(A \cup B)' = A' \cap B'$$

$$(A \cup B) \cup (C \cup D) = A \cup B \cup C \cup D$$

$$A \cap B = B \cap A$$

$$A \cup B = B \cup A$$