

Basic Ideas from Chpt. 2, Sect. 2.1—

An **experiment** is a process that results in an outcome that cannot be predicted in advance with certainty.

e.g.,

The set of all possible outcomes of an experiment is called the **sample space** for the experiment.

e.g.,

A subset of a sample space is called an **event**.

e.g.,

Note: The empty set,  $\emptyset$ , is a set with no outcomes or elements in it. For example,  $\emptyset = \{ \}$ .

The empty set is an event as is the entire sample space.

We say an event has occurred if the outcome of the experiment is one of the outcomes in the event.

e.g.,

## Combining Events

- The **union** of two events,  $A$  and  $B$ , denoted  $A \cup B$ , is the set of outcomes that belong either to  $A$ , to  $B$ , or to both. In words,  $A \cup B$  means “ $A$  or  $B$ .” Thus, the event  $A \cup B$  occurs whenever either  $A$  or  $B$  (or both) occurs.
- The **intersection** of two events  $A$  and  $B$ , denoted  $A \cap B$ , is the set of outcomes that belong both to  $A$  and to  $B$ . In words,  $A \cap B$  means “ $A$  and  $B$ .” Thus, the event  $A \cap B$  occurs whenever both  $A$  and  $B$  occur.
- The **complement** of an event  $A$ , denoted  $A^C$ , is the set of outcomes that do not belong to  $A$ . In words,  $A^C$  means “not  $A$ .” Thus, the event  $A^C$  occurs whenever  $A$  does *not* occur.

## Mutually Exclusive Events

- The events  $A$  and  $B$  are said to be **mutually exclusive** if they have no outcomes in common.
- More generally, a collection of events  $A_1, A_2, \dots, A_n$  is said to be mutually exclusive if no two of them have any outcomes in common.