11.4 Fundamentals of Probability

The **probability** of an event is the likelihood that it will occur. Probabilities range from 0 to 1 and may also be expressed as 0% to 100%. An event that is certain to occur has a probability of 1, or 100%. An event that is impossible has a probability of 0.

**VOCABULARY**

**Experiment** is any occurrence for which the outcome is uncertain.

**Sample space** is the set of all possible outcomes of an experiment, denoted by *S*.

**Event**, denoted by *E* is any subset of a sample space.

**Sum** of the theoretical probabilities of all possible outcomes is 1.

# Objective 1: Compute theoretical probability

If an event *E* has  equally likely outcomes and its sample space *S* has  equally-likely outcomes, the theoretical probability of event *E*, denoted by , is

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# Objective 2: Compute empirical probability

**Theoretical probability** is based on a set of equally likely outcomes and the number of elements in the set. By contrast, **empirical probability**, also called **experimental probability,** is based on observations of how frequently an event occurs.

The empirical probability of event E is

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