

Basic Notation and Definitions

Definition. A *random experiment* is any procedure whose outcome is random.

Ex. Rolling a die, recording how long a lightbulb lasts.

Definition. The *sample space* of a random experiment is the set of all possible outcomes.

Ex. Discrete sample space: Roll a die. $S = \{1, 2, 3, 4, 5, 6\}$.

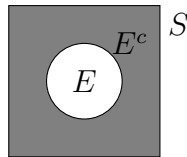
Ex. Continuous sample space: Time (in days) until lightbulb breaks. $S = [0, \infty)$.

Definition. An *event* E is a subset of S .

Ex. $E = \{2, 4, 6\}$ is the event that the die displayed an even number.

Ex. The event that the lightbulb burns out in less than a week is $F = [0, 7)$.

Definition. The *complement* of an event E is the set of outcomes in S which are not in E . The complement, denoted E^c , is the shaded region shown below.

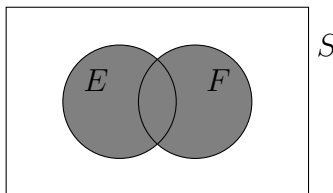


Ex. $E^c = \{1, 3, 5\}$, which is the event that an odd number is rolled.

Ex. $F^c = [7, \infty)$, which is the event that the bulb lasts at least one week.

Definition. A *compound event* is some combination of two or more events.

Definition. The *union* of events E and F is the event that the outcome of the random experiment is in E or F , or both. This is a compound event, denoted $E \cup F$, is the shaded region shown below.



Definition. The *intersection* of events E and F is the event that the outcome of the random experiment is in both E and F . This is a compound event, denoted $E \cap F$, is the shaded region shown below.

