

Notes – 6.2 Probability Models

For probabilities in a finite sample space, assign a probability to each individual outcome. These probabilities must be numbers between 0 and 1 and have a sum of 1.

The probability of any event is the sum of the probabilities of the outcomes making up the event.

Addition rule – If A and B are disjoint events, the probability of A or B is

$$P(A \cup B) = P(A) + P(B)$$

Example 1

You roll two dice and record the outcomes.

a. What is the probability that

1. the sum is 5?
2. the sum is greater than 8?
3. the sum is odd?

General Addition rule – If A and B are events (not necessarily disjoint), the probability of A or B is

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

b. What is the probability that

1. the sum is greater than 8 or odd?
2. the sum is a multiple of 3 or less than 4?

Multiplication Rule – If A and B are independent events, the probability of A and B is

$$P(A \cap B) = P(A)P(B)$$

Example 2

A consumer organization estimates that over a 1-year period 17% of cars will need to be repaired once, 7% will need repairs twice, and 4% will require three or more repairs.

Create a probability table.