

Basic Probability Definitions



Preliminaries and Objectives

Preliminaries

- General Counting Principle
- Permutations
- Combinations
- Binomial Theorem

Objectives

- Know the definitions of common probability terms

Events

E denotes an **event**, something that might happen randomly.

Examples:

- E = a coin lands tails
- E = player makes a free throw
- E = height of water in river exceeds the banks this spring

Probability of event E is denoted $P(E)$.

$$\text{For any event } E: \quad P(E) \geq 0 \quad P(E) \leq 1$$

Definition of Probability

It is best when the possible outcomes can be listed in a way that they are all equally likely.

For example, when flipping two coins, the possible outcomes are $\{HH, HT, TH, TT\}$

In this case, we merely count the outcomes in an event and divide by the total possible outcomes.

$$P(E) = \frac{\text{number of outcomes in event } E}{\text{number of total outcomes}}$$

$$P(\text{one head on two flips}) = \frac{2}{4}$$

Example 2

What is the probability that when rolling two dice, one blue and one red, the total is 10?



$$P(E) = \frac{\text{number of outcomes in event } E}{\text{number of total outcomes}}$$

$$P(\text{two dice} = 10) = \frac{3}{36}$$