

Math 140: Chapter 3 Probability

3.1 Probability Basic Concepts

Experiment:

Example 1. Examples of experiments:

Outcome:

Sample Space:

Notation for sample space:

Size of sample space:

Example 2. What is the sample space for Rolling a 6-sided die and flipping a coin?

$$S =$$

$$n(S) =$$

Event

Example 3. Rolling a number less than three and tails

$$E = \qquad \qquad \qquad n(E) =$$

There are two basic ways to calculate probabilities: theoretical probability and empirical probability.

Classical (Theoretical) Probability

Rounding Rule for probability:

Example 4. Classical probability Experiment: Rolling a fair 12 sided die.

$S =$

Event A: rolling a prime number $A =$

Event B: rolling a number divisible by 5 $B =$

Event C: rolling a number greater than 4 which is divisible by 3

$C =$

Find the following probabilities.

$P(A) =$

$P(B) =$

$P(C) =$

Empirical (Experimental) Probability

Example 5. Julia made a die for a game. It had 5 faces, labeled 1-5. Because of the shape of the die, it was biased in favor of rolling a 3. She experimented to estimate how likely it was for a 3 to be rolled. Julia rolled the die 100 times, and the number of times she rolled a 3 was 45.

Example 6. Empirical Probability: Choosing a student from a survey

	Accounting	Non Accounting
Freshman	20	50
Soph	14	56

1. What is the probability of choosing a student who is majoring in accounting?
2. What is the probability of choosing a student who is a sophomore?
3. What is the probability of choosing a student who is not majoring in accounting?

Properties of Probability

1. For any event A , $0 \leq P(A) \leq 1$. That is, the probability of any event is always a number between 0 and 1.
2. The probability of any event A is equal to the sum of the probabilities of the individual outcomes in A .
3. The sum of the probabilities of all outcomes in S must equal 1. This is true whether S consists of equally likely outcomes.