

## 2.2 Theoretical Probability

### A Experimental Probability

Experimental probability may be determined at the end of a probability experiment by:

$$P(E) = \frac{\text{number of successful trials (when the event } E \text{ happened)}}{\text{total number of trials}}$$

In order to use this formula:

- ✓ Run several trials for a probability experiment like rolling a die, tossing a coin, drawing a card from a deck
- ✓ Record every outcome
- ✓ Define an event related to the set of outcomes and compute the experimental probability

### B Theoretical Probability

Theoretical probability is another measure of the likelihood of an event and is defined by:

$$P(E) = \frac{\text{number of successful outcomes (when the event } E \text{ happened)}}{\text{total number of possible outcomes}}$$

In order to use this formula:

- ✓ Identify all possible outcomes for a probability experiment (just think about it, do not run the experiment)
- ✓ Consider each outcome equally likely
- ✓ Define an event related to the set of outcomes and compute the theoretical probability

Example 1. Toss (in your mind) a coin.



a) What are the possible outcomes?

b) What is the probability to get a head?

Example 2. Roll (in your mind) a 6-face die.



a) What are the possible outcomes?

b) What is the probability to get the number 5?

c) What is the probability to get an even number?





















































d) What is the probability to get a number less or equal to 4?



b) What is the probability to get a double (both dice show the same number)?

c) What is the probability that the sum of both numbers is 5?

Example 5. Draw a card from a standard deck.

	Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
Clubs													
Diamonds													
Hearts													
Spades													

a) What is the probability to draw an ace card?

b) What is the probability to draw a heart card?

c) What is the probability to draw a face card?

d) What is the probability to draw the 7-spade card?