

Sec. 12-7 Theoretical and Experimental Probability

Vocabulary

Outcome: the result of a single trial, such as spinning a wheel

Sample space: all the possible outcomes

event: any outcome or group of outcomes

favorable outcomes: the outcomes that match a given event

event	sample space	favorable outcomes
↓	↓	↓
rolling an even number	1, 2, 3, 4, 5, 6	2, 4, 6

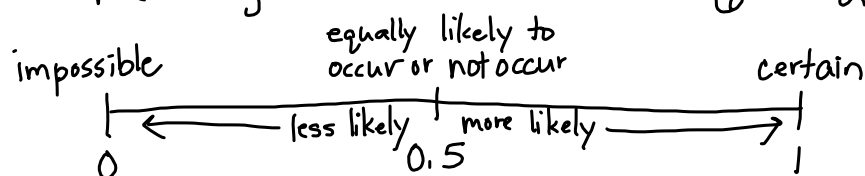
probability: of an event, $P(\text{event})$, tells you how likely it is an event will occur.

When all possible outcomes are equally likely, you can find the

theoretical probability

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$P(\text{rolling an even number}) = \frac{3}{6} = \frac{1}{2}$$



Complement of an event: consists of all outcomes in the sample space that are NOT in the event. $P(\text{not event})$

The outcomes for the complement of rolling an even number are 1, 3, and 5.

$$P(\text{event}) + \overset{\text{Complement}}{P(\text{not event})} = 1$$

$$\frac{1}{2} + \frac{1}{2} = 1$$

$$P(\text{not event}) = 1 - P(\text{event})$$

Odds: the likelihood of an event as a ratio comparing the number of favorable and unfavorable outcomes

$$\text{odds in favor of an event} = \frac{\text{number of favorable outcomes}}{\text{number of unfavorable outcomes}}$$

$$\text{odds against an event} = \frac{\text{number of unfavorable outcomes}}{\text{number of favorable outcomes}}$$

ex: odds in favor of rolling an even number

fav out: 2, 4, 6

unfav. out: 1, 3, 5

$$\text{odds} \rightarrow \frac{3}{3} = \frac{1}{1} \text{ or } 1:1$$

experimental probability: based on data from trials

$$P(\text{event}) = \frac{\text{number of times the even occurs}}{\text{number of trials}}$$