11.7 Introduction to Probability

Experiment: toss a coin twice

Sample space of this experiment

$S = \{HH, HT, TH, TT\}$

# of elements of $S = 4$

Definition: A sample space of an experiment is the set of all possible outcomes of the experiment.

An event is a subset of the sample space.

Eg. Event A: get a H and a T : $= \{HT, TH\}$

Event B: get 2 Heads $B = \{HH\}$

Event C: get at least a T $C = \{HT, TH, TT\}$

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Event D: get no T $D = \{HH\}$

Probability of A (chance that A happens) $:= \frac{\#\text{ of elements in } A}{\#\text{ of elements in } S} = \frac{2}{4} = \frac{1}{2}$

Notation: $P(A) = \frac{1}{2}$

$P(B) = \frac{1}{4}$

$P(C) = \frac{3}{4}$

Toss a coin 3 times

How many elements are there in the sample space S?

Ans: 8

Event E = exactly 2 heads. $P(E) = \frac{3}{8}$

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* Toss a coin 4 times.

Event E = get exactly 2 Heads

$P(E) = \frac{6}{16} = \frac{3}{8}$

# of elements in $S = 16$

* Roll 2 dice

How many elements are there in the sample space?

36

E: event that sum is 12. $P(E) = \frac{1}{36}$.

$E = \{(6,6)\}$

F: the sum is 5 $F = \{(4,1), (1,4), (3,2), (2,3)\}$ $P(F) = \frac{4}{36} = \frac{1}{9}$.

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