



PROBABILITY

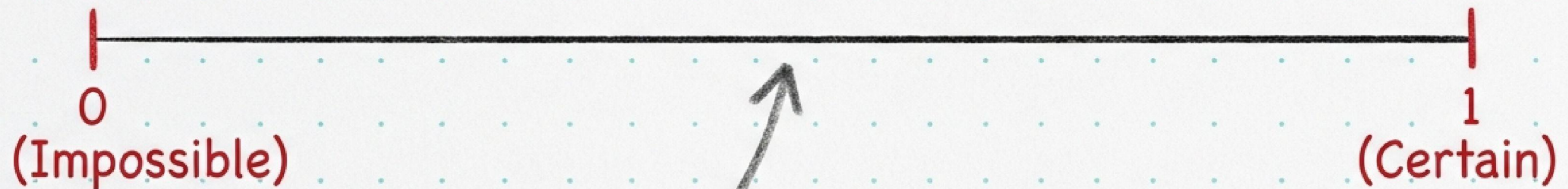
Brief Study Notes



Predicting the uncertain.

1. Introduction

Probability is the branch of Mathematics dealing with the likelihood or chance of an event occurring.



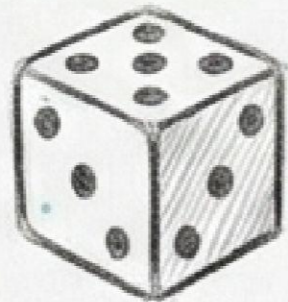
Helps us predict outcomes in uncertain situations.

2. Random Experiment

An experiment where the outcome cannot be predicted with certainty.



Tossing a coin



Throwing a dice



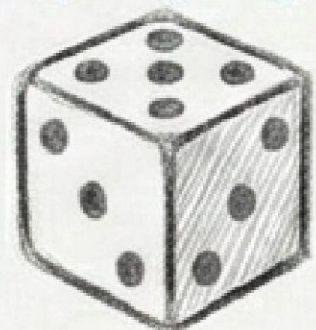
Drawing a card

3. Sample Space (S)

The set of all possible outcomes of a random experiment.



$$\text{Coin: } S = \{H, T\}$$

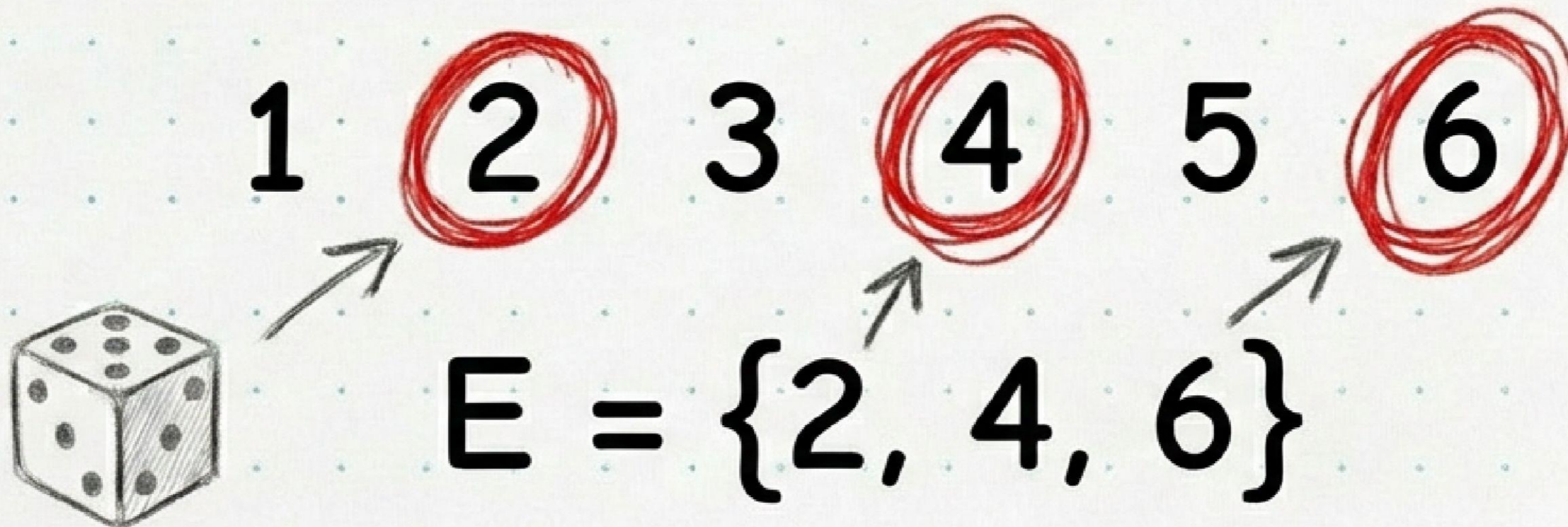


$$\text{Dice: } S = \{1, 2, 3, 4, 5, 6\}$$

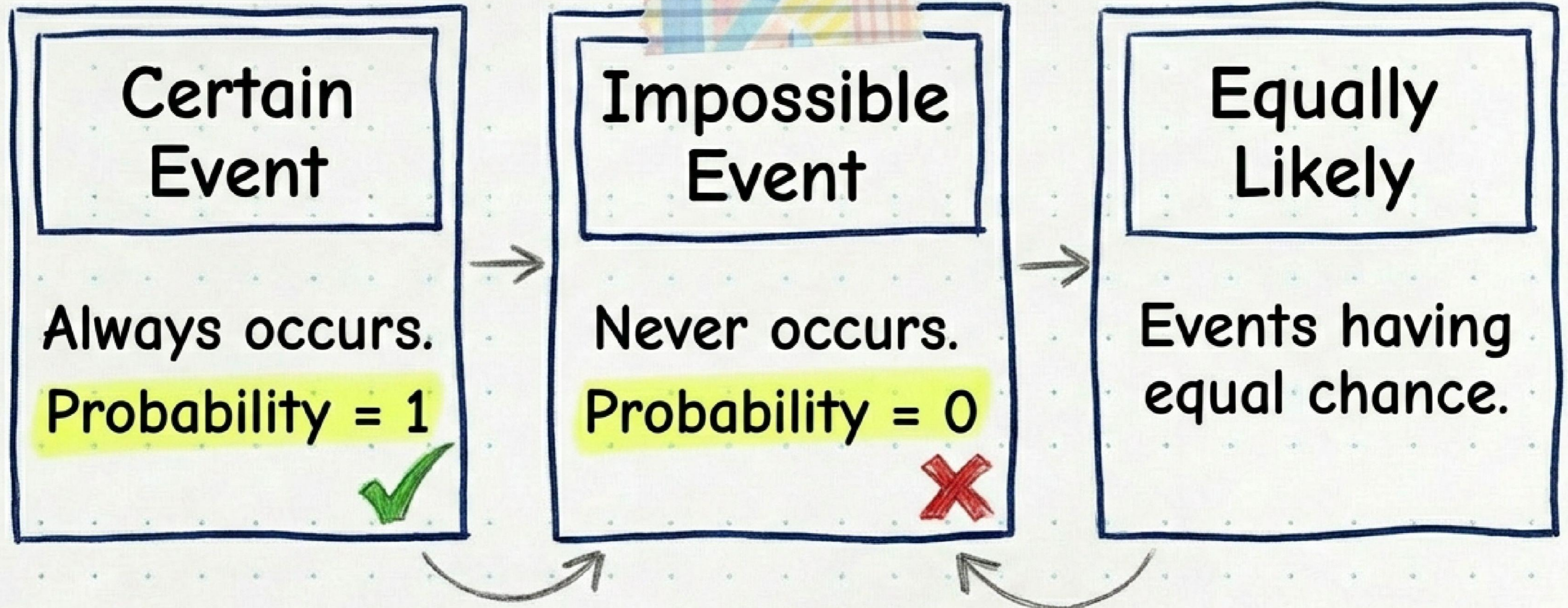
4. Event (E)

A subset of the **Sample Space**.
(What we want to happen).

Example: Getting an even number on a dice.



5. Types of Events



6. The Formula

What we want

$$P(E) = \frac{\text{Number of Favourable Outcomes}}{\text{Total Number of Outcomes}}$$

Everything possible

$$0 \leq P(E) \leq 1$$

Example 1: The Coin

Problem: Find the probability of getting a Head (H).



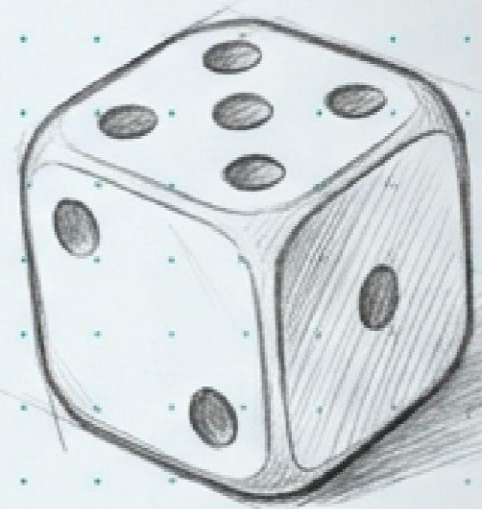
Favourable outcomes = 1 (H)

Total outcomes = 2 (H, T)

$$P(H) = \frac{1}{2}$$

Example 2: The Dice

Problem: Find the probability of getting a number divisible by 3.



Sample Space $S = \{1, 2, 3, 4, 5, 6\}$

Favourable = $\{3, 6\}$ (That is 2 outcomes)

Total = 6 outcomes

$$P = \frac{2}{6} = \frac{1}{3}$$

8. Complementary Event (E')

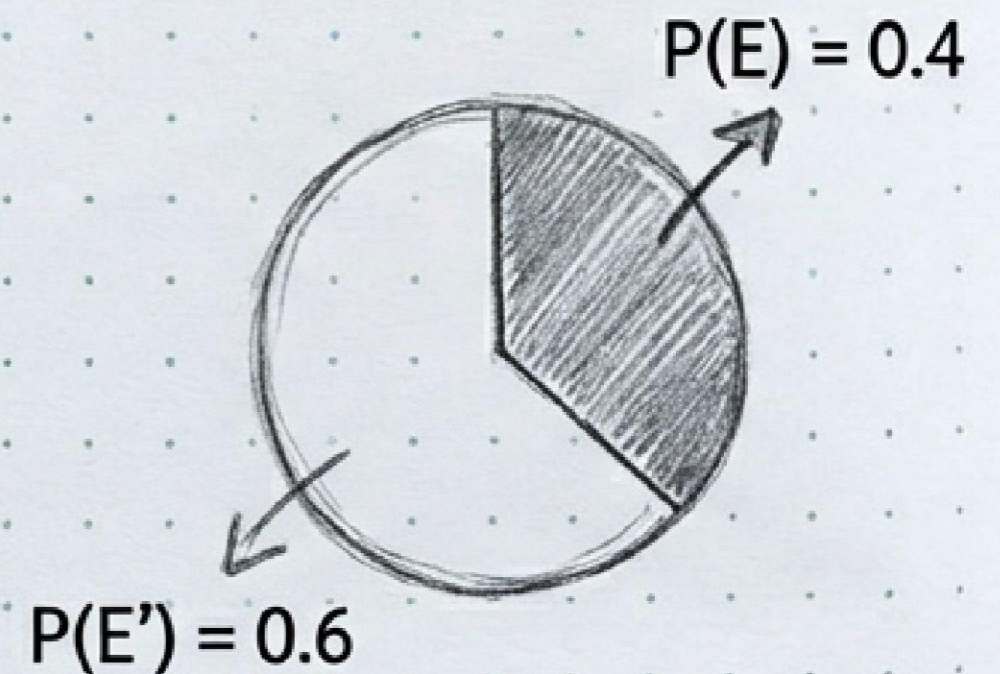
E' means 'Not E'.

$$P(E') = 1 - P(E)$$

Example:

If $P(E) = 0.4$, find $P(\text{Not } E)$.

Calculation: $P(E') = 1 - 0.4 = \underline{\underline{0.6}}$



Pop Quiz (Part 1)

Q1. Probability of a sure event is:

a) 0

b) $1/2$

c) 1

d) -1

Q2. If a dice is thrown, how many outcomes are possible?

a) 2

b) 4

c) 6

d) 8

Pop Quiz (Part 2)

Q3. Which is an impossible event?

- ~~a) Head on coin~~
- ~~b) Tail on coin~~
- c) Getting number 7 on a dice**
- ~~d) Drawing a red card from a deck~~

Q4. If $P(E) = 0.25$, then $P(E')$ is:

0.75

$$\frac{1 - 0.25}{}$$

Cheat Sheet / Summary

$$P(E) = \frac{\text{Favourable}}{\text{Total}}$$

Range: 0 to 1

The 'Not' Rule: $P(E) + P(\text{Not } E) = 1$



Good Luck!

