Agenda

- Introduction
- Basic Terminologies
- Set Operations
- Addition Rule
- Code: CrossTab

Introduction

- 5 Assignments (Mandatory) $\Rightarrow$ 85%
- 3 Homework Q's (Optional)

In-Class Additional Q's

- Module test → MCQ → 70% } VVI
- Mock Interview

for Placement   Scaler

Basic Terminologies

① Experiment

Activity that we want to try/execute

Expl Deterministic Experiment

$$a^2 + b^2 + 2ab \longrightarrow 49$$

$$a = 3 \quad b \Rightarrow 4. \quad ?$$

Exp2: Probabilistic Experiment

$$\boxed{H}_{\bigcirc} \xrightarrow{Toss} H \,/\, T$$

② Outcomes:

Possible Output

Roll a Die $\xrightarrow{Outcome}$ $\{1\} \quad \{2\} \quad \{5\}$
$\{3\} \quad \{4\} \quad \{6\}$

③ Sample Space

A collection of all possible Outcomes

Toss ⊃ { H, T }

Dice ⊙ { 1, 2, 3, 4, 5, 6 }

① Event ↙

Any subset of Sample Space

Ex: Rolling Dice, getting (even)

Number

Event_even → { 2, 4, 6 }

② Rolled dice → Num > 2

ε → { 3, 4, 5, 6 }

① Dice ⊙ { 1, 2, 3, 4, 5, 6 }

Sample ↓

Event ⊙ { 3 } ✓

Set → { 3 } ✓

Sample Space $\rightarrow$ N outcomes

1 2 --- 2
L X L X --- ©N
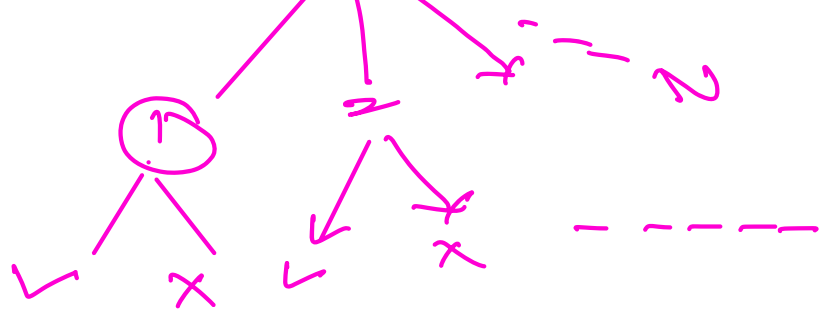
Total Events $\rightarrow$ ©²N

Q) S $\rightarrow$ { 1 2 3 4 5 6 }

E $\rightarrow$ { 1 3 5 (7) }

S C E X

Q) Toss a Coin
$+$
Roll a Dice

Outcomes Coin	Outcome Dice

H

T

1
2
3
4
5
6
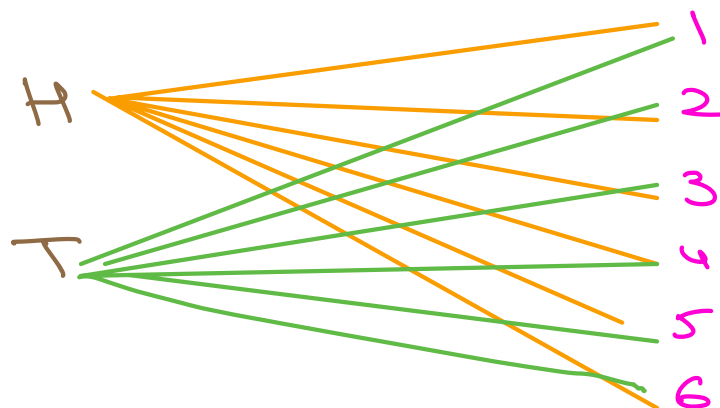
Outcome Coin x Outcome Dice

9   12
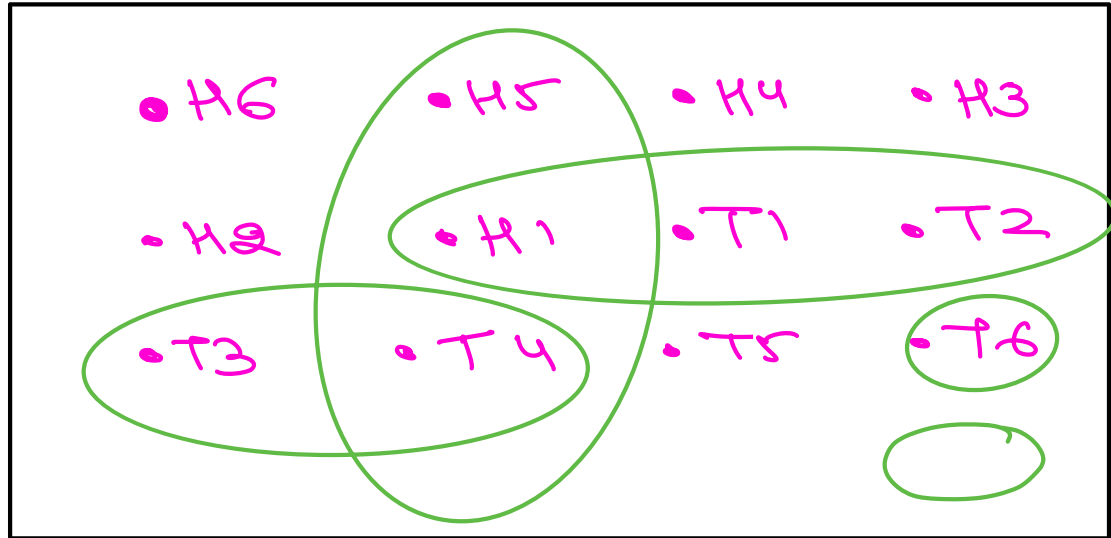
Sample Space

○ → Event

● → Outcome

▭ → Sample Space

* Set Operation

Sample Space $\longrightarrow$ Universal Set

Event $\longrightarrow$ Subsets of Universal Set

$\{1 \ 2 \ 3 \ 4 \ 5 \ 6\}$

Betting of Outcome of Dice

① Mohit ⊙ Odd Number

$A \odot \{1 \quad 3 \quad 5\}$

② Rakesh ⊙ 1, 5, or 6

$B \odot \{1, 5, 6\}$

③ Abhishek : Even Numbers

$C \odot \{2, 4, 6\}$

$A \cap C \odot \{ \ \}$ $\boxed{D \cdot E / MEE}$

$$P_{event} = \frac{\text{Outcomes in Event}}{\text{\# Outcomes in SS}}$$

$$A \cup B = A + B - A \cap B$$

* Disjoint Events/Mutually Exclusive Events

$$E_1 \cap E_2 = \varnothing$$

* Exhaustive Event

$$E_1 \cup E_2 = S$$

① $M \cup A$ } Sample Space

② $M \cup A \cup R$

* Joint Events / Non Mutual Exclusive Events

$$E_1 \cap E_2 = \cancel{2 \ 3}$$

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Independent Events

</div>

We can say two Events are independent if Outcome of Event 1 does Not Impact Outcome in Event 2
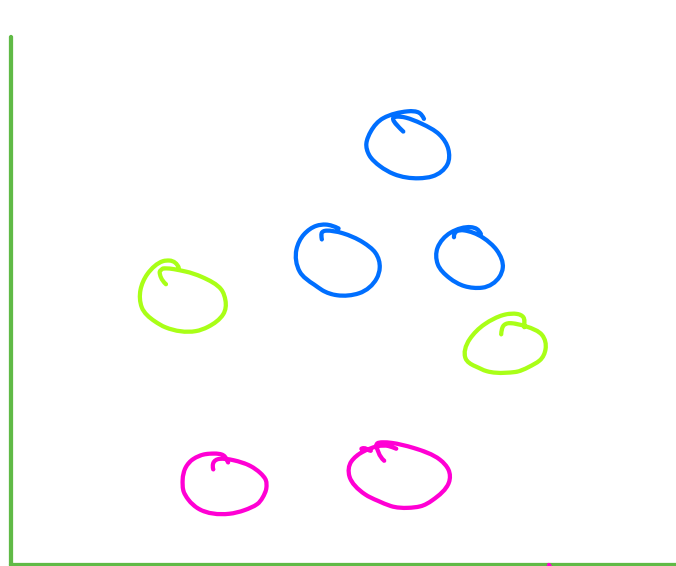
Toss   Dice Roll

↓   1

H   2   X
                         3   No Impact
T
                         4

                         5

                         6

$$P(A \cap B) = P(A) * P(B)$$

$$P(H) \quad \frac{1}{2} \quad \& \quad P(6) = \frac{1}{6}$$

$$= \frac{1}{12}$$

$$SS \quad \frac{2 * 6}{12}$$

- $H2 = \frac{1}{12}$

Independent
Pick with
Replacement

Dependent
Pick without
Replacement

A → 2 4 6   P(A) → 3/6

B → 1 2   P(B) → 2/6

C → 1 4 5 6   P(C) → 4/6

|Ω| = 1   P(A U B)   . Either A or B is

$$\frac{\text{# Outcomes in Event}}{\text{# Outcomes in Samp}}$$

A U B → 1 2 4 6   A+B − A∩B

S → 1 2 3 4 5 6   6

$$P(A \cup B) = \frac{|A \cup B|}{|S|} = \frac{4}{6}$$

| | → Count

Q2   Both Winning = A∩B

$$P(A \cap B) \quad \frac{1(\leq 23)}{6} = \frac{1}{6}$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\boxed{\text{Addition Rule}}$$

Q   Value of $P(A \cup B)$ in case of
Disjoint / MGE

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Quiz

G   4

Y   6

B   2

$$P(Y \cup B) = \frac{\# 8}{\# 12} = \frac{6}{12} + \frac{2}{12}$$

Q. Which of the following represent mutually exclusive sets?

✓	A	Youtube premium Vs Non-premium users	100%
	B	People who like cappacinno vs Espresso	0%
	C	Users of Swiggy vs Zomato	0%
	D	Users of Amazon vs Flipkart	0%

End Quiz Now

$$E_1 \cap E_2 \Rightarrow \{\}$$

$$M \in E \Leftarrow \Rightarrow \quad \cap \Rightarrow \{\}$$

60% 50%
S   N

S   Not   Zomato

60 − 20 ⇒   40%

$$P(S \cap Z^s) = P(S) - P(S \cap Z)$$
$$\hookrightarrow 60 - 2$$