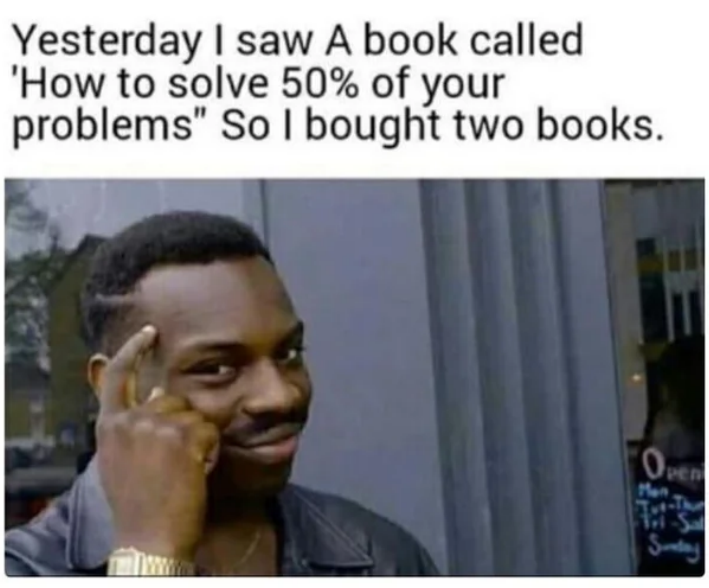
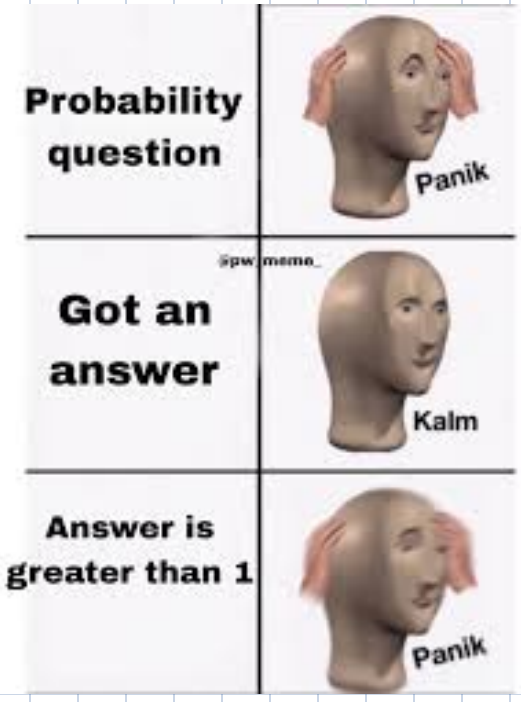
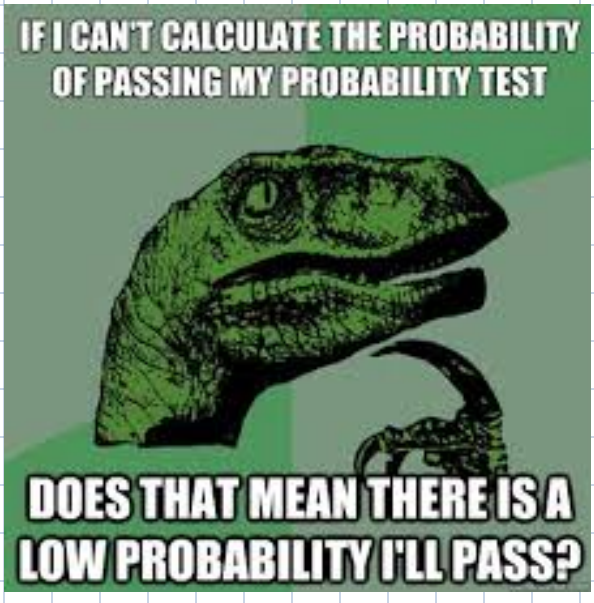
Agenda


Yesterday I saw A book called 'How to solve 50% of your problems" So I bought two books.


Probability question
Panik
Got an answer
Kalm
Answer is greater than 1
Panik


*Teacher
So, the next chapter is "PROBABILITY"
*Student
saala "PROBABILITY" bolke "PERMUTATION & COMBINATION" padha diya

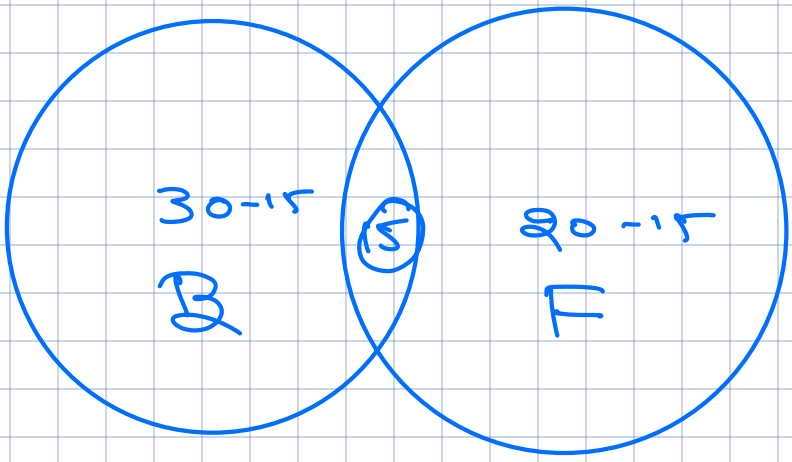

IF I CAN'T CALCULATE THE PROBABILITY OF PASSING MY PROBABILITY TEST
DOES THAT MEAN THERE IS A LOW PROBABILITY I'LL PASS?

Questions

Question 1: In a class of 50 students, 30 students play Basketball, 20 students play Football, and 15 students play both Basketball and Football.
If a student is selected at random, what is the probability that the student plays either Basketball or Football, or both?

Options:
A) 0.7
B) 0.5
C) 0.9
D) 0.4

$P(B \cup F)$



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

$$= 30/50 + 20/50 - 15/50$$

$$= 35/50$$

Question 2:

Two events A and B are such that:

- $P(A) = 0.5$
- $P(B) = 0.4$
- $P(A \cap B) = 0$

Which of the following is TRUE?

Options:

A. A and B are independent ✗

B. A and B are mutually exclusive ✓

C. A and B are exhaustive ⇒ $P(A) + P(B) = 1$ ✗ 0.9

D. $P(A \cup B) = 0.1$ ✗ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Coin Toss ⇒ $P(H)$

Dice ⇒ $P(6)$

$P(H \cap 6) = \frac{1}{2} \times \frac{1}{6} =$.

* In 'independent events' $P(A \cap B) = P(A) \times P(B)$

Question 3:

Context: In a startup, 60% of employees are developers and the rest are marketers.
20% of the developers and 50% of the marketers work remotely.
An employee is selected at random and is found to be working remotely.

What is the probability that the person is a developer?

Options:

A. 0.24
B. 0.375
C. 0.6
D. 0.45

Solve this using formula

P_D = 0.6

P_M = 0.4

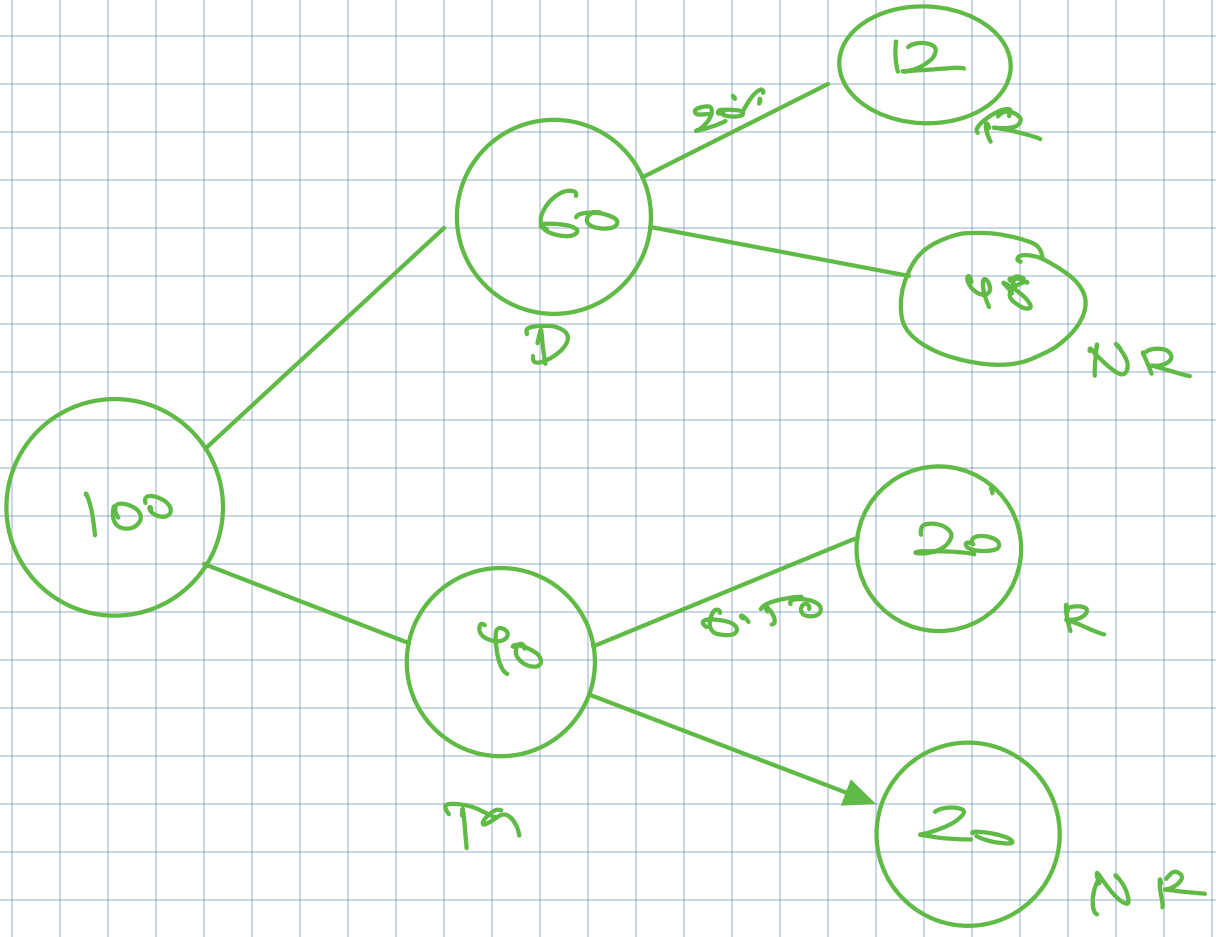
P_remot_devs = 0.20

P_remot_mkts = 0.50

$$P(D|R) = \frac{P(R|D) * P(D)}{P(R)}$$

Law of Total P

P_R = P(R|D) * P(D) + P(R|M) * P(M)



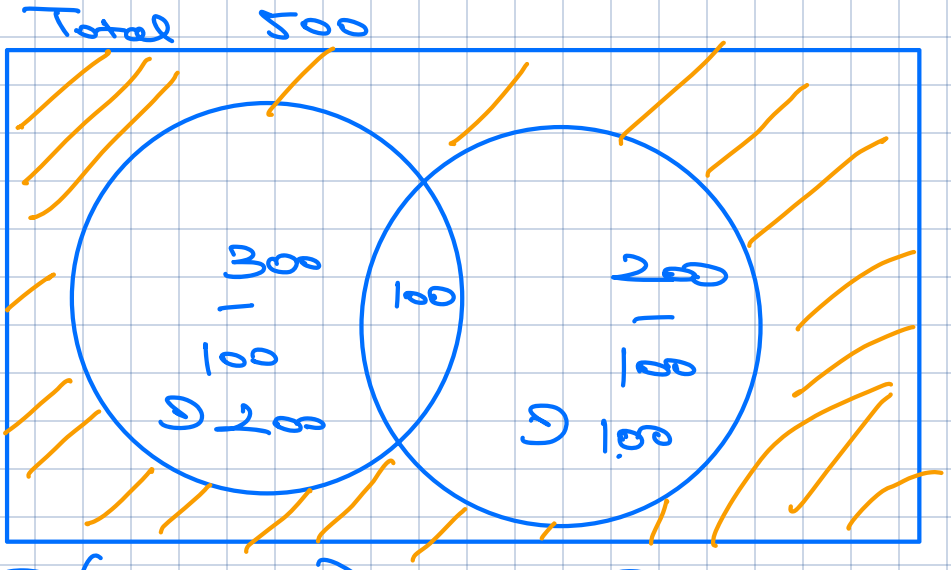
P – D | R ⇒ $\frac{12}{32}$

Question 4:

Context: A hospital collects data on 500 patients.
Of them:

- 300 had a fever
- 200 had a cough
- 100 had both fever and cough

If a patient is selected at random, what is the probability that the patient has neither fever nor cough?



$\Rightarrow P(F \cup C) \Rightarrow$ Fever or Cold

$\Rightarrow 1 - P(F \cup C)$

$\Rightarrow 1 - P(F) + P(C) - P(F \cap C)$

$\Rightarrow 1 - 0.6 + 0.4 - 0.2$

$\Rightarrow 1 - 0.80 \quad 0.2$

Question 5:

A tech conference has 6 keynote speakers but only 4 seats on the stage. The order matters due to speaking sequence. Two of the speakers are identical twins who are indistinguishable and can share one seat together as a unit.

How many distinct ways can the 4-stage seats be filled?

Permutation

Options:

A) 360
B) 180
C) 312
D) 240

Case 1: Both Sit

① Both sit together on one # 6 − 2 # 4

$t_1 t_2$. 4 . 3 . 2

4 $t_1 t_2$ 3 2

⇒ 4 × 24

4 × 24 ⇒

② They don't sit together Addition HW

Case 2: Only 1 twin sits

t_1 4 3 2

4 × 24

+

⇒ 2 × 4 × 24

2 × 4 × 24

t_1 or t_2

t_2 4 3 2

4 × 24

Case 3: No twin

4 3 2 1 ⇒ 24

⇒ 312

Question 6:

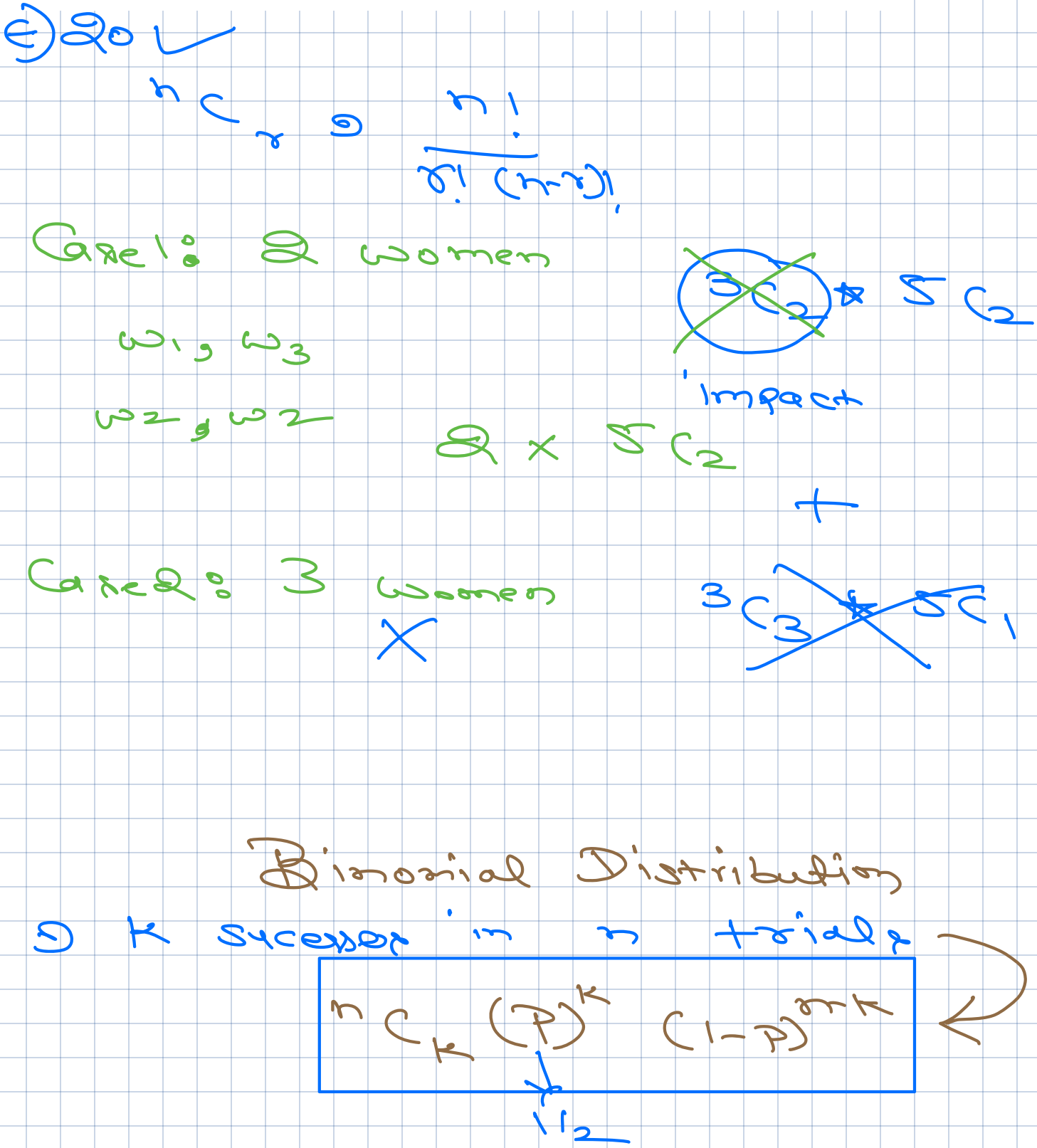
A company has 8 developers (5 men and 3 women). It wants to form a 4-member tech committee such that:

- At least 2 women are included
- Two women (W1 and W2) refuse to work together

How many valid committees can be formed?

Options:

A) 25
B) 40
C) 50
D) 60



Question 7:

A student appeared for four subjects with the following marks and credit weights:

Subject	Marks	Credits
Math	80	4
Physics	70	3
Chem	90	2
Bio	60	1

Due to a policy change, Physics and Chemistry marks are counted only if they are above 75, else they contribute zero.

What is the correct weighted average?

$$\frac{80 \times 4 + 0 * 0 + 90 \times 2 + 60 \times 1}{4 + 0 + 2 + 1}$$

Question 8:

A logistics company recorded delivery durations (in minutes) for 15 urgent parcels delivered during a snowstorm:
`[25, 28, 28, 30, 33, 36, 37, 37, 100, 38, 39, 41, 44, None, 47]`

Due to data loss, one value is None, and the analyst decides to drop it before computing any statistics. They want to compute the Interquartile Range (IQR) to identify unusually late deliveries (outliers).

What is the correct IQR?

Options:

A. 12.0
B. 9.4
C. 6.5
D. 9.75 ✓

① Sort

② Q_1 and Q_3

③ IQR = $Q_3 - Q_1$

④ Find Outlier →

$P_{min} = Q_1 - 1.5 * IQR$

$P_{max} = Q_3 + 1.5\ IQR$

Question 10:

Let X be a discrete random variable representing the number of vehicles entering a gated parking lot per hour:

- $P(X = 0) = 0.1$,
- $P(X = 1) = 0.2$,
- $P(X = 2) = 0.3$,
- $P(X = 3) = 0.4$

What's the expected number of vehicles, and is this variable discrete or continuous?

Options:

A. 2.0, Continuous ✗
B. 2.0, Discrete
C. 3.0, Discrete
D. 3.0, Continuous ✗

Weighted Avg
with X as P
it also referred as ExpVal

Question 9:

A data analyst is trying to convince their team that customer engagement is stable. The monthly active users (MAU) for the last 10 months are: `[18, 22, 22, 25, 27, 28, 29, 30, 31, 95]`

The team argues that the data is highly skewed, but the analyst responds:
"Well, the mean and median aren't too far apart, and the mode is one of the most common values, so clearly engagement is stable."
Based on mean, median, mode, standard deviation, and range,

Which of the following statements most exposes the flaw in the analyst's argument?

Options:

A. The standard deviation is low, so the distribution is tightly clustered.
B. The mode being 22 suggests users consistently engage at that level.
C. The mean is inflated due to an extreme value, despite median being moderate. ✓
D. Since the median is the mean, it confirms the data is normal.

Case 1: Both sit

6 − 2

4 people left

t_1+t_2	4	3	2

↓

$4 \times 4 \times 3 \times 2$

Case 2: One twin sits

$t_1, t_2 \to 2$

4

$4 + t_1$ ✗

t_2	4	3	2
4	t_2	3	2

$4 \times 4 \times 3 \times 2$ ← Stop here

t_1	4	3	2
4	t_2	3	2

$4 \times 4 \times 3 \times 2$

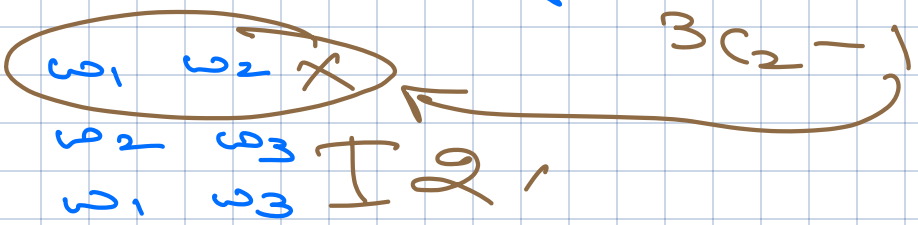
Case 3: No twins

4	3	2	1

3 women 5 men

$^3C_2 * {}^5C_2$

w_1 and w_2 X



$= 2 * {}^5C_3$