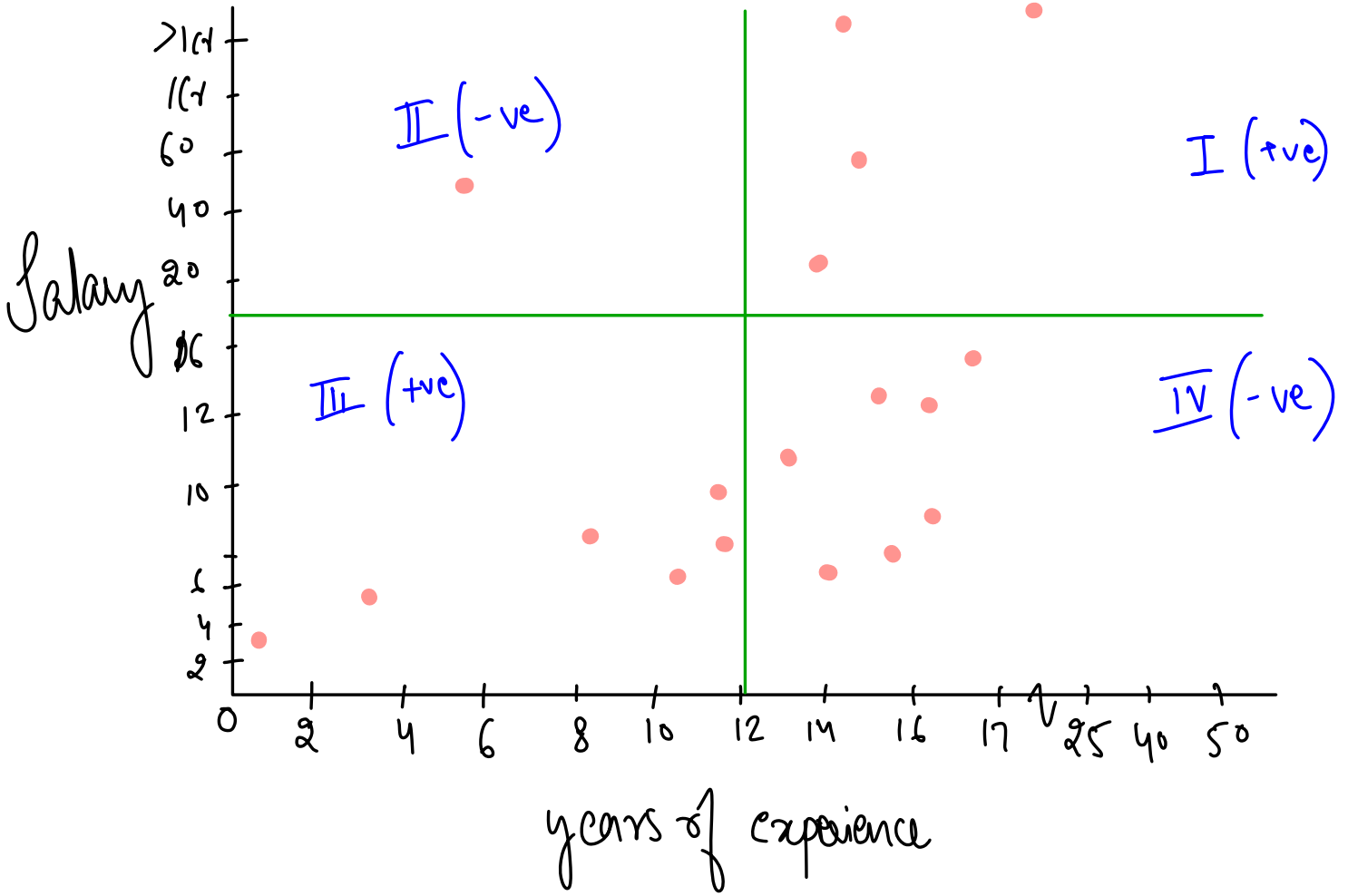
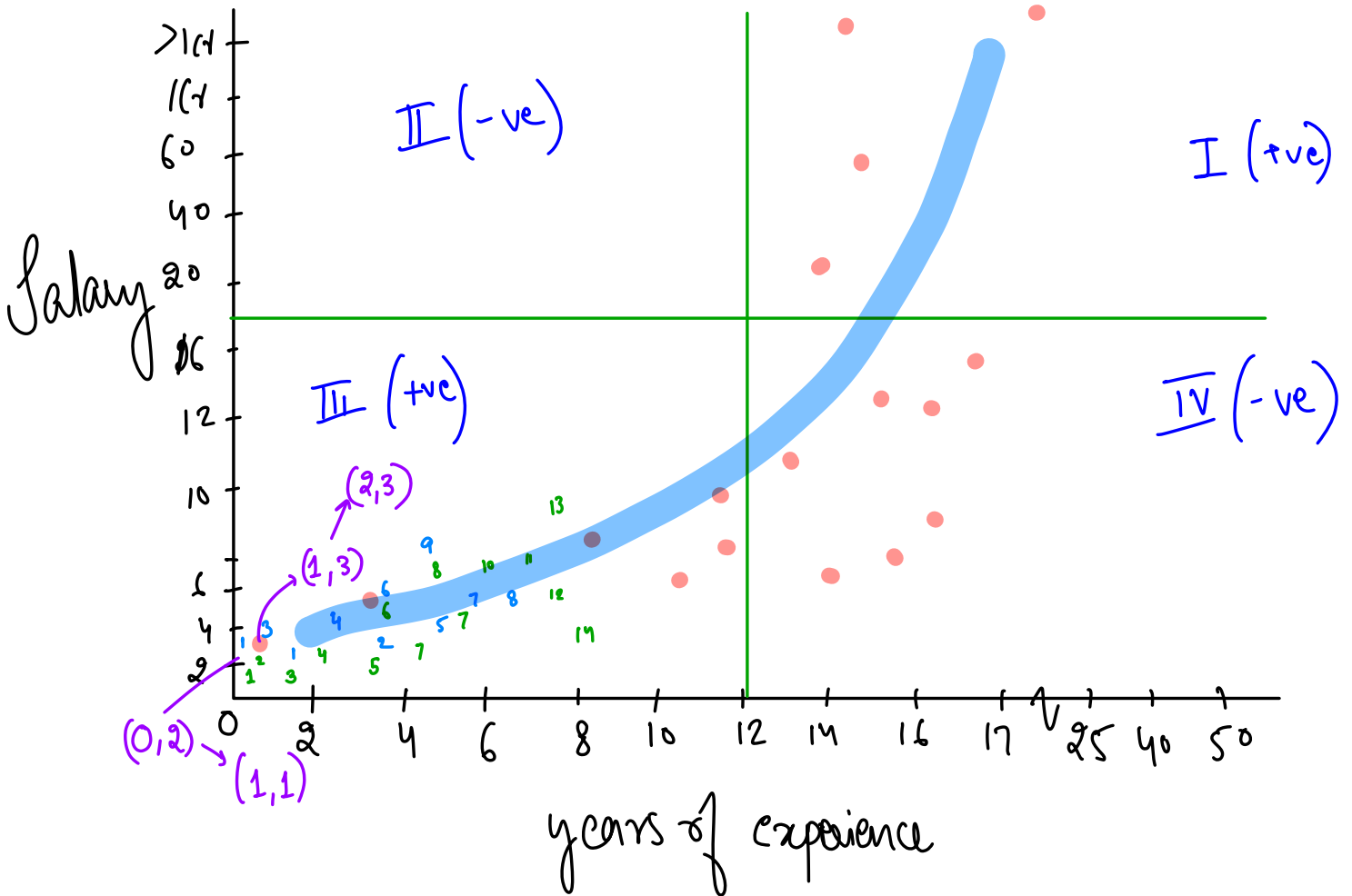
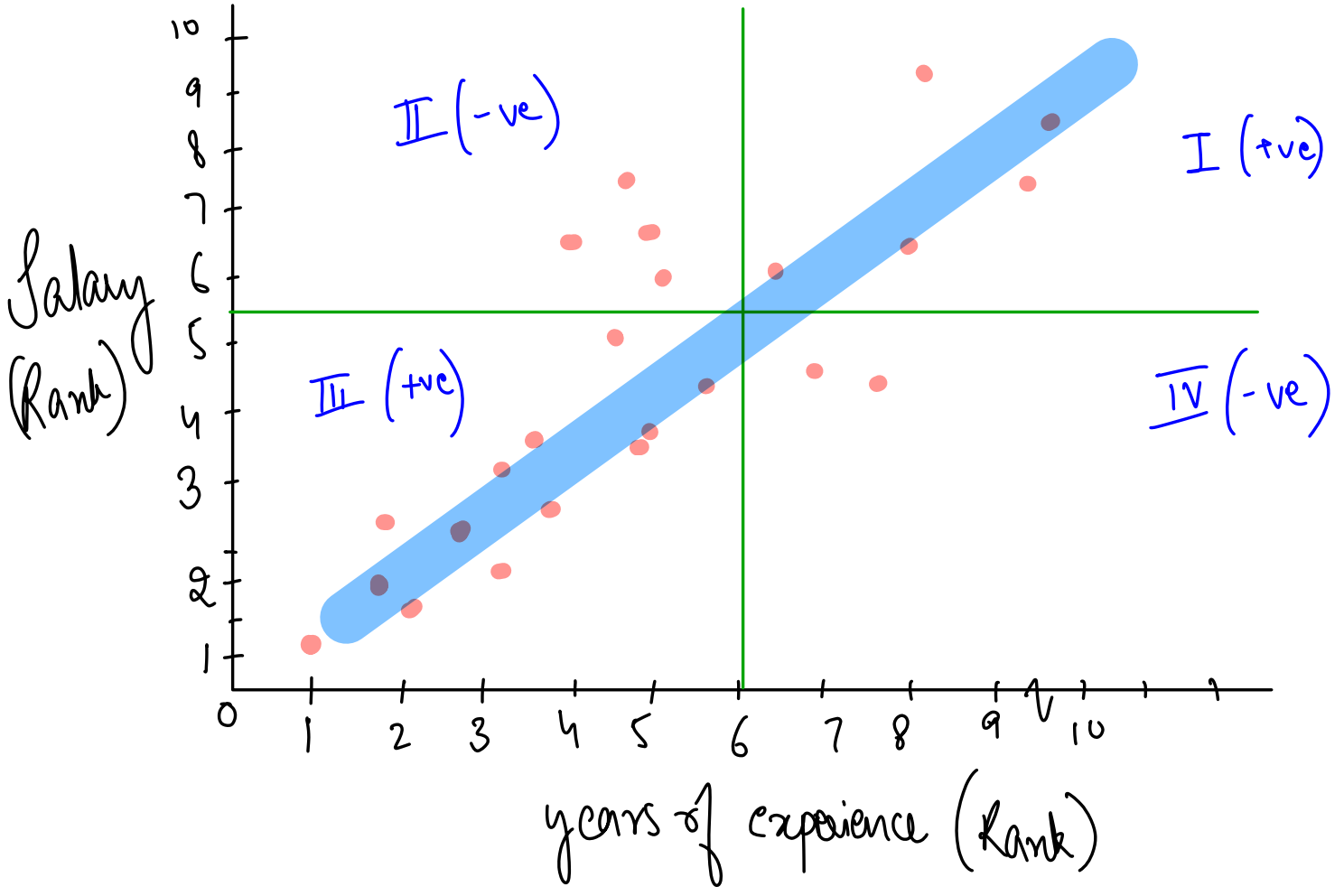
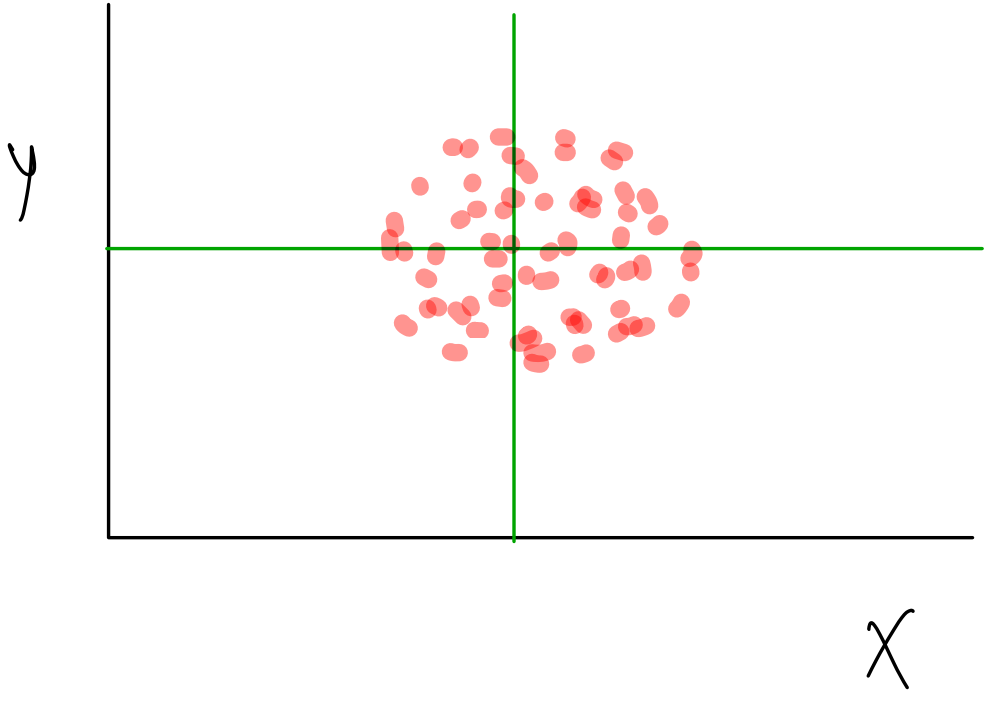
ADVANCED DISTRIBUTIONS-1

POISSON


>100
100
60
40
20
16
12
10
8
4
2
Salary
II (-ve)
I (+ve)
III (+ve)
IV (-ve)
0
2
4
6
8
10
12
14
16
17
25
40
50
years of experience


Salary
years of experience
II (-ve)
I (+ve)
III (+ve)
IV (-ve)
(0,2)
(1,1)
(1,3)
(2,3)
0
2
4
6
8
10
12
14
16
17
25
40
50


Salary (Rank)
10
9
8
7
6
5
4
3
2
1
0
II (-ve)
I (+ve)
III (+ve)
IV (-ve)
1
2
3
4
5
6
7
8
9
10
years of experience (Rank)



$Cor \approx Cov \approx 0$

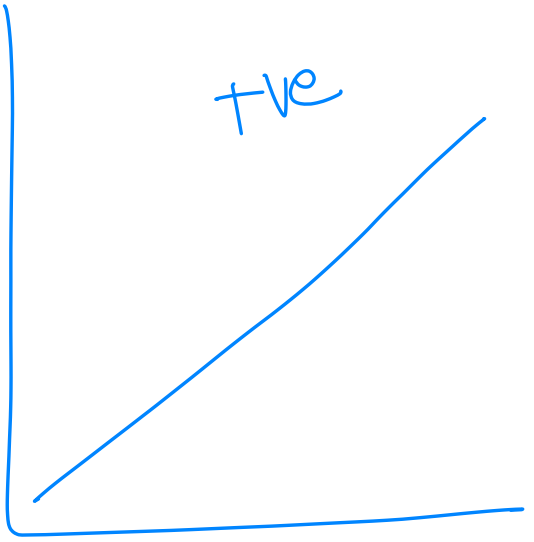
Uncorrelated

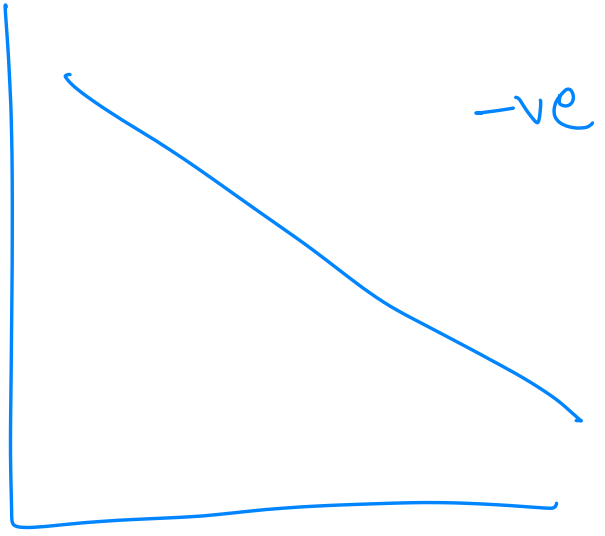
Spearman Rank Correlation Coefficient

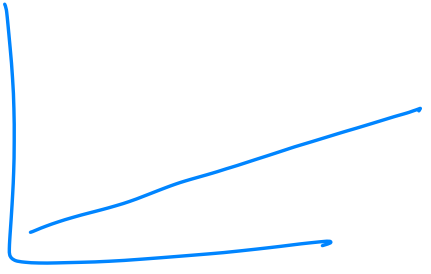
$$S_{x_{Rank}\, y_{Rank}} = \frac{Cov(x_{rank}, y_{rank})}{\sigma_{x_{Ranks}}\, \sigma_{y_{Ranks}}}$$

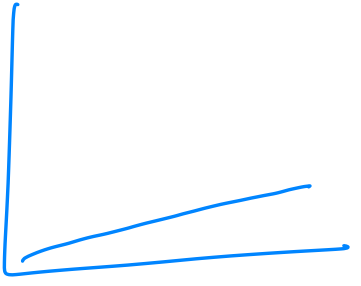
H	0	1	W
0	68	72	
1	62	58	
2	64	67	
3	61	72	
4	70	79	
5	66	61	
6	61	68	
7	65	64	
8	71	80	
9	72	79	

H	W
7.0	6.5
3.0	1.0
4.0	4.0
1.5	6.5
8.0	8.5
6.0	2.0
1.5	5.0
5.0	3.0
9.0	10.0
10.0	8.5


+ve

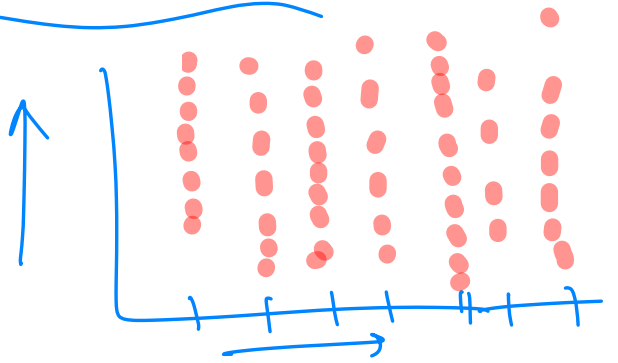

-ve





1960 . . . . 2020, 2021, 2022, 2023

↳ Correlation



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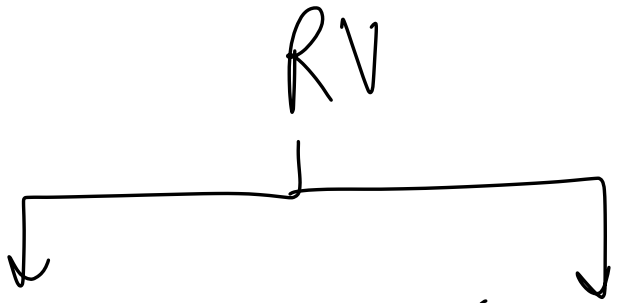
1. Binomial
2. Normal / Gaussian
3. Geometric

POISSON



pmf
cdf

Binomial
Geometric

ppf

Normal / Gaussian

pdf
cdf

POISSON

"Count of occurrences in a given time/space interval"

Discrete — Continuous

Football Game

Avg # of goals per 90 mins = 2.5

What is the prob of having 1 goal in the last 30 mins?

Rate: 2.5 G / 90 Mins

2.5 G → 90 mins

1.25 G → 45 mins

Customer going to a store

Avg # of Customer / day = 100.3

P[10 Customers in next 1 hour]

Rate 100.3 C / 1 day

100.3 C → 24 hour

4.17 C → 1 hour

Support Team

100 Call / hour.

P[50 calls in 2 hours]

Rate: 100 Calls / 1 hour

100 C — 1 hour

200 C — 2 hour

Hospital

Avg # accident / day = 3

P[5 patients will arrive tomorrow]

Rate: 3 A / D

3 A — 1 day

6 A — 2 days

Rate: Avg no. of occurrences in a given time/space interval

discrete

Continous

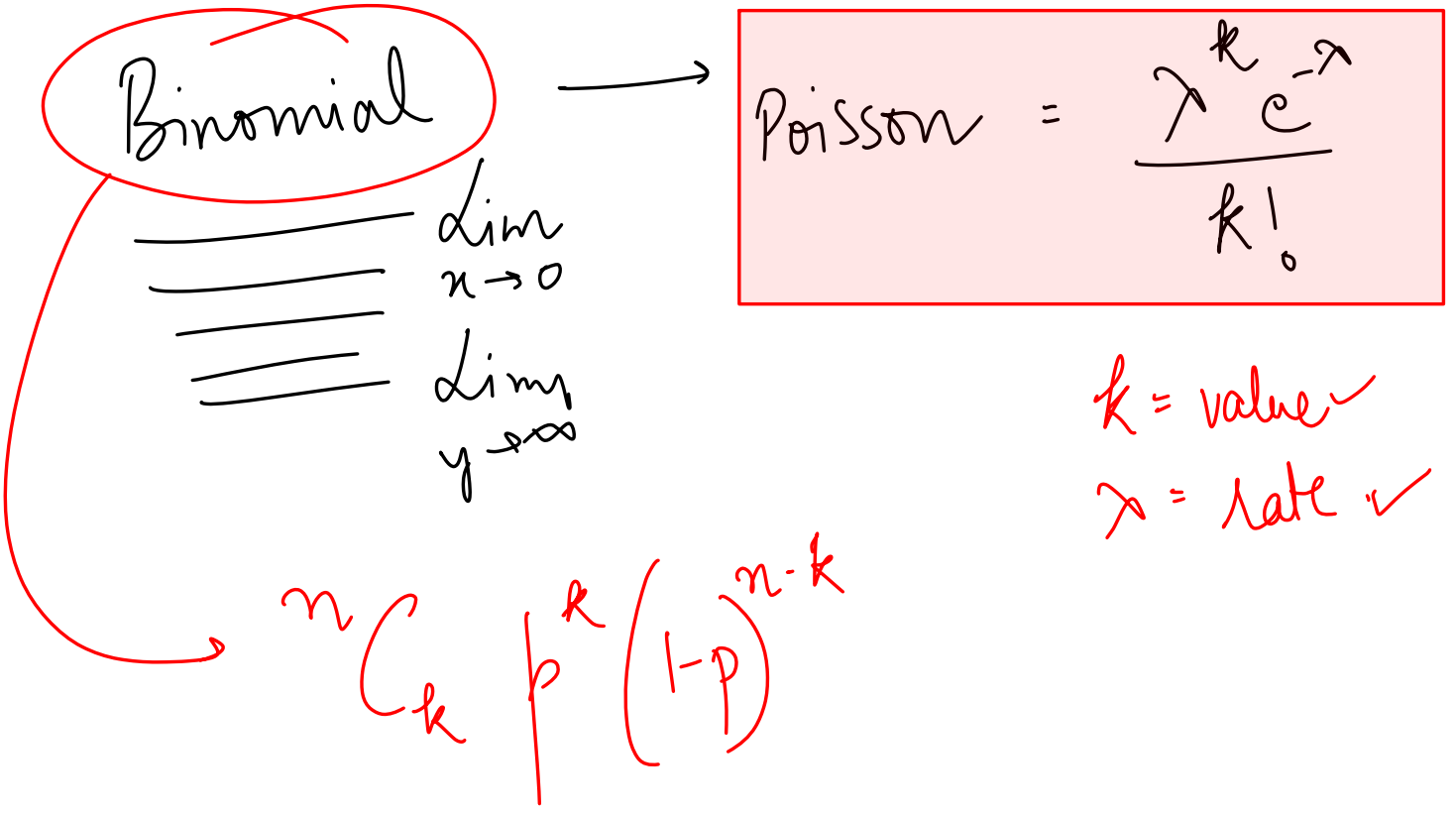
Notation

λ, mu — coding

mathematics.

Rules

1. Counting: Random Variable that we have chosen must be the no. of occurences. In an interval.
2. Independance: Occurence are independant.
3. Rate is independant from actual occurence.
4. No simultaneous occurence.


Binomial
Poisson = $\frac{\lambda^k e^{-\lambda}}{k!}$
$\lim_{n \to 0}$
$\lim_{y \to \infty}$
k = value
λ = rate
${}^{n}C_{k}\, p^{k} (1-p)^{n-k}$

A city sees 3 accidents per day on average.
Find the probability that there will be 5 accidents tomorrow?

Rate: 3 A / Day $\quad \lambda = 3$

X = "No. of accidents in a day"

$k = 5$

$$P[X=5] = \frac{\lambda^k e^{-\lambda}}{k!} = \frac{3^5 e^{-3}}{5!} = 0.1008$$

$$P(X=5) = \text{poisson.pmf}(k=5, \lambda=3) = 0.10$$

Let " X" be the number of typos in a page in a printed book, with mean 3 typos per page.
What is probability that a randomly selected page has atmost 1 typo?

$k = 1$

$\lambda = 3T/P$

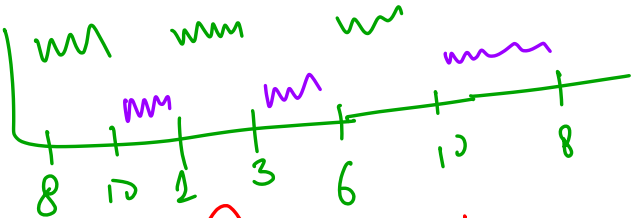
$X = 0, 1$

$$P[X \leq 1] = P[X=0] + P[X=1] = 0.19$$

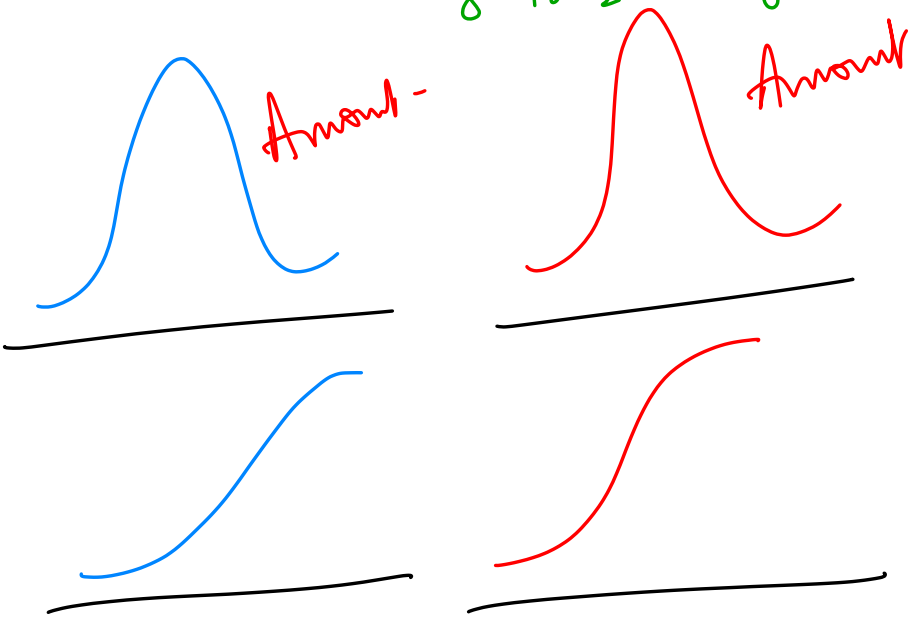
$$\frac{3^0 e^{-3}}{0!} + \frac{3^1 e^{-3}}{1!}$$

$P(X<=1) = poisson.cdf(k=1, mu=3) = 0.19$

Doubts ① Calls Poisson



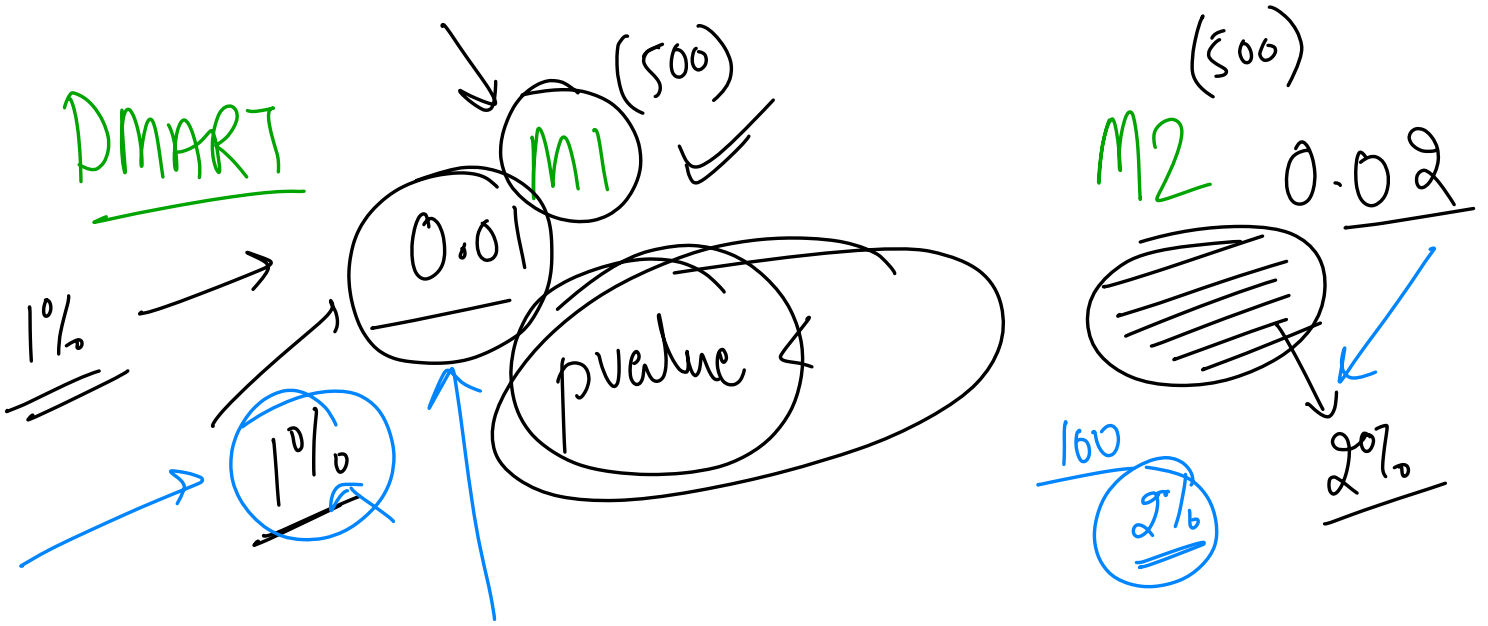
②

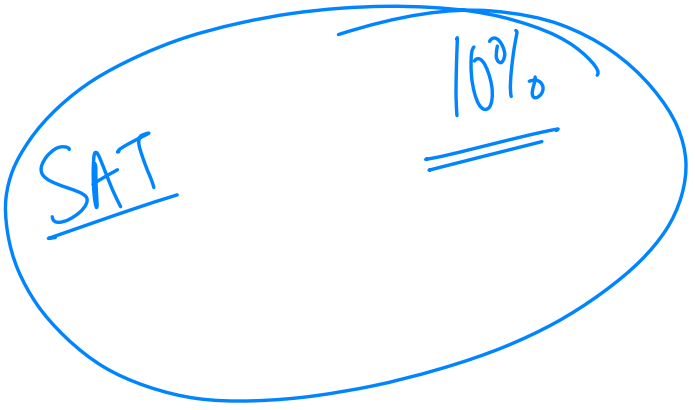


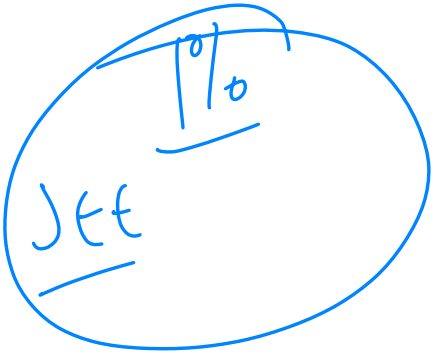
$P[\text{Evidence} \mid H_0 \text{ is true}]$

$H_0 \quad \mu_1 = \mu_2$

$H_0 \cdot \quad \mu_1 \neq \mu_2$




SAT
10%


1%
JEE