Experiment :

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Practical - 01.

Fitting of Binomial Distribution

x_i	f_i	$f_i x_i$	Probability	E.F (Prob. Σf_i)
1	4	4	0.037176	4.275248
2	13	26	0.129169	14.85448
3	28	84	0.249335	28.67354
4	42	168	0.288774	33.20903
5	20	100	0.200671	23.07716
6	6	36	0.077471	8.909148
7	2	14	0.012818	1.474053
	$\Sigma f_i = 115$	$\Sigma f_i x_i = 432$		

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{432}{115} = 3.756522.$$

$n = 7$

$$p = \frac{\text{Mean}}{\text{No. of observation (n)}} = \frac{3.756522}{7}$$

$$= 0.536646$$

* Functions used :-

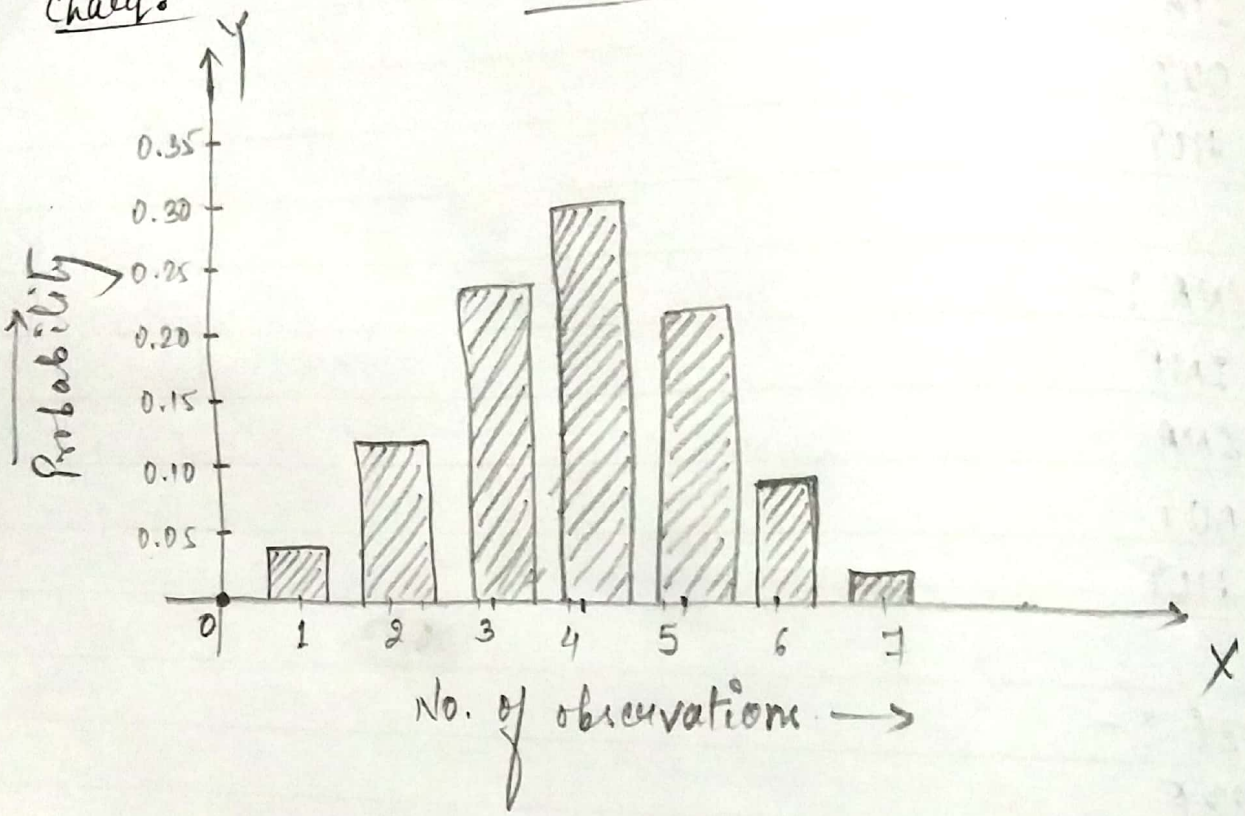
i). SUM :- $= SUM(B2:B8)$ for Σf_i and $\Sigma f_i x_i$

ii). BINOM.DIST :- $= BINOM.DIST(x, Trials, sp, c)$

- x → Value of 'x'
- Trials → No. of observation
- sp → Probability of success
- c → false (PMF ⇒ F, PDF ⇒ T)

Binomial Distribution

Chart:-



Experiment :

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Practical - 03

Fitting of Poisson Distribution

x_i	f_i	$f_i x_i$	Probability	EF (Prob. × f_i)
0	153	0	0.32804	145.979
1	169	169	0.36564	162.71
2	72	144	0.20377	90.679
3	31	93	0.07571	33.6906
4	12	48	0.0211	9.38797
5	6	30	0.0047	2.09278
6	2	12	0.00087	0.38877
	$\Sigma f_i = 446$	$\Sigma f_i x_i = 496$		

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{496}{446} = 1.11461$$

* functions used :-

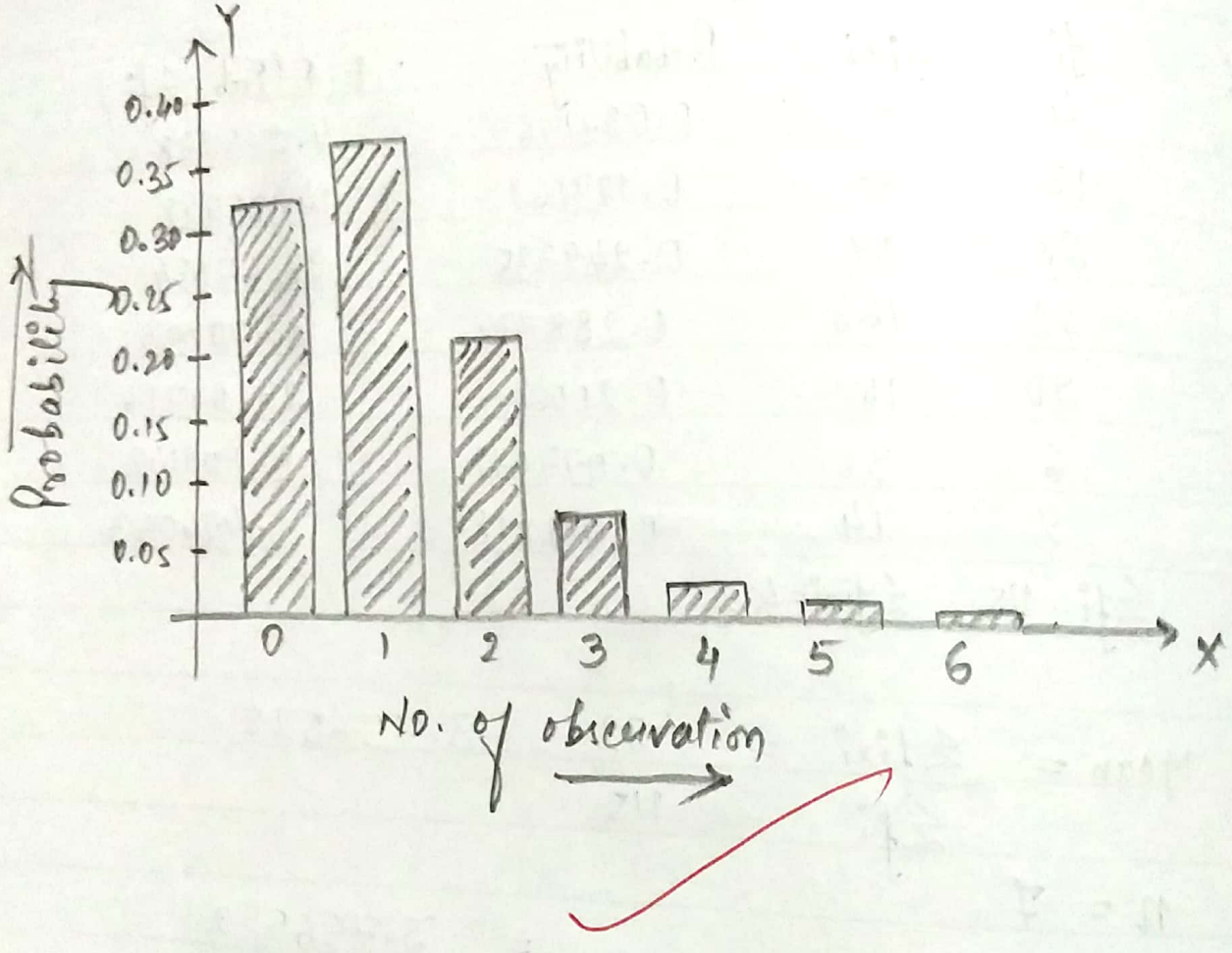
i). SUM :- = SUM(B2:B8) for Σf_i & $\Sigma f_i x_i$

ii). POISSON.DIST :- = POISSON.DIST (Number, Mean, Cumulative)

Number ↓ value of 'x' — Mean ↓ mean — Cumulative ↓ false (P.M.F)

DELTA

Poisson Distribution



Experiment :

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Practical - 06

Fitting of exponential Distribution

No. of years	No. of persons	lower limit	upper limit	frequency
0-3	190	0	3	190
3-6	70	3	6	70
6-9	25	6	9	25
9-12	10	9	12	10
12-15	4	12	15	4
15 and above	1	15	18	1

$\Sigma f = 300$

Mid Value {(UL+LL)/2}	Frequency x Mid Value	Probability
1.5	285	0.60725
4.5	315	0.2385
7.5	187.5	0.09367
10.5	105	0.03679
13.5	54	0.01445
16.5	16.5	0.00567

$\Sigma FM = 963$

Mean = $\Sigma FM / \Sigma F = 963/300 = 3.21$, $\lambda = \frac{1}{\text{Mean}} = 0.31153$

* Functions used :-

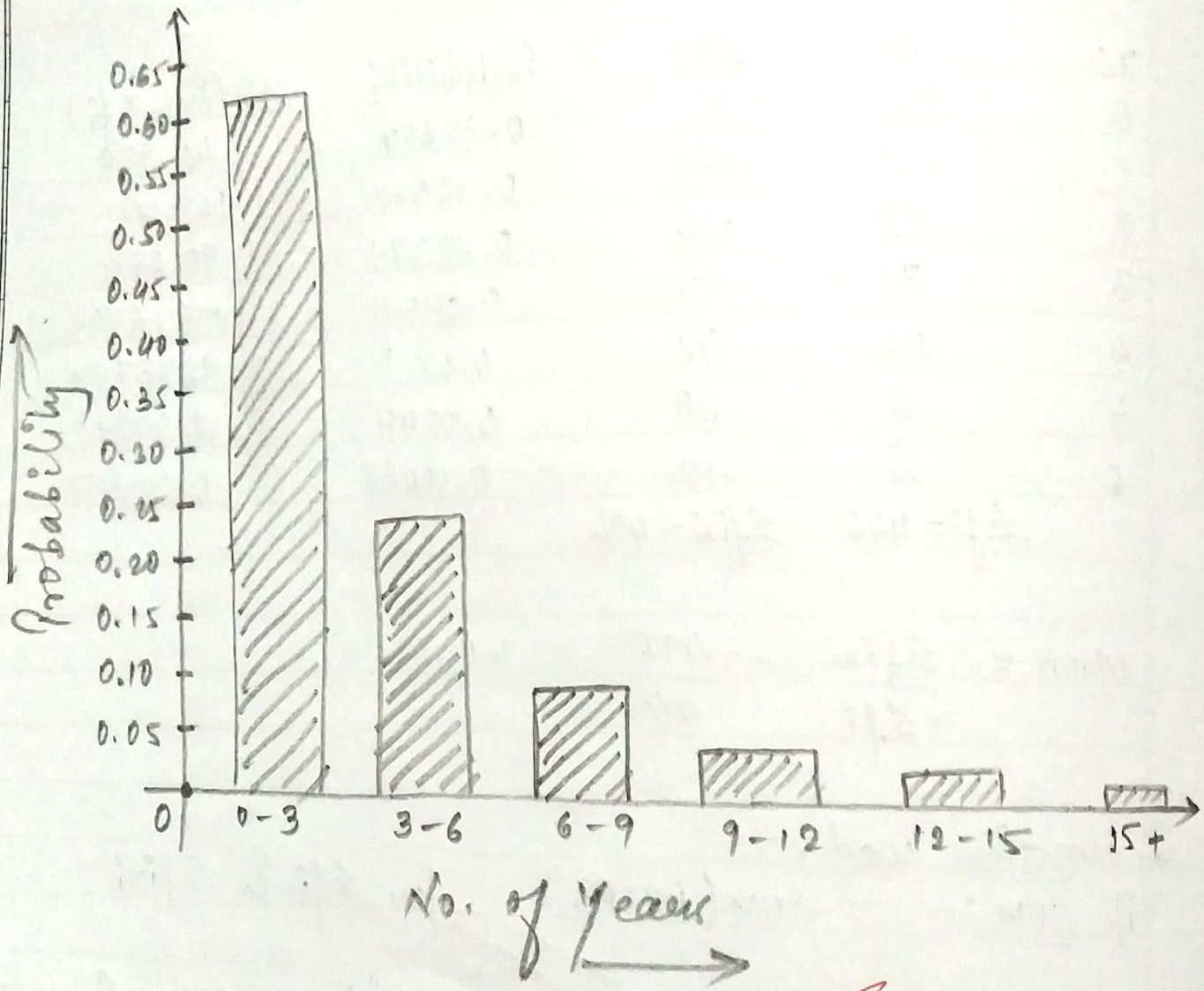
i). SUM :- = SUM(E2:E7) for Σf and ΣFM.

ii). EXPON.DIST :- = EXPON.DIST (Number, lambda, c)

UL/LL value of λ True

DELTA

Exponential Distribution



Experiment :

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Program-04

Fitting of Geometric distribution

Q:- Suppose we are flipping a coin and we want to know the probability that it will take ~~Zero~~ zero, one, two or three "failures" untill a coin finally lands on heads.

Probability of success (p)	Number of failures (k)	Geometric Prob.
0.5	0	0.5
0.5	1	0.25
0.5	2	0.125
0.5	3	0.0625

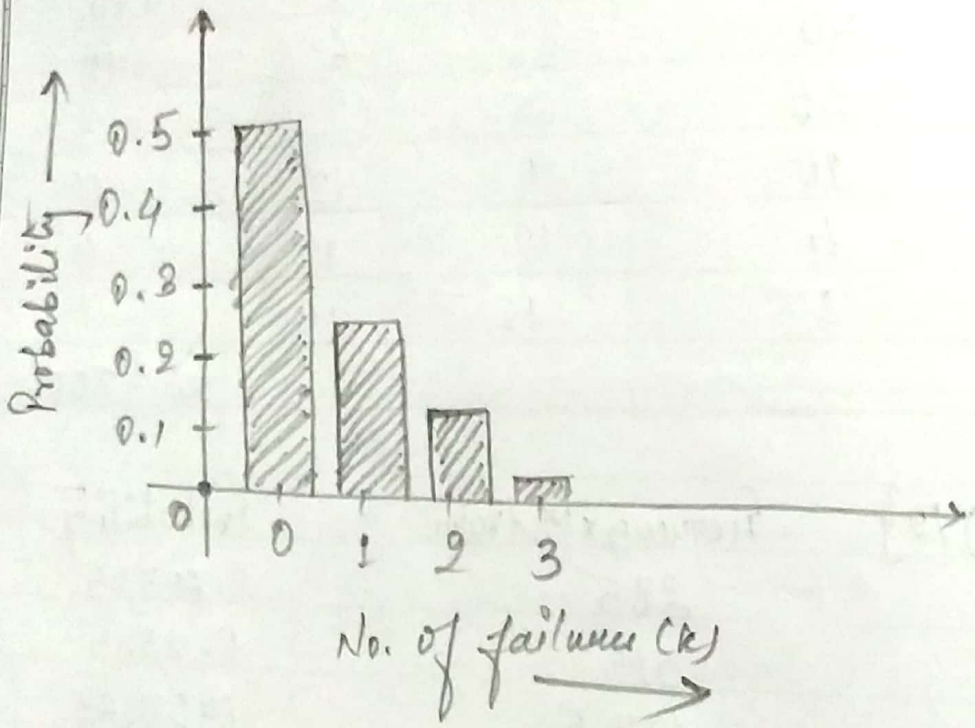
* Formula used :-

$$P(x = k) = (1-p)^{k-1} \cdot p$$

where, 'p' is probability of success and (1-p) is probability of failure.

DELTA

Geometric Distribution



Experiment :

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Practical - 05 :- Fitting of Uniform Distribution.

Q:- X is uniformly distributed over (0, 10).

$a = 0$, $b = 10$.

i). $x < 3$ ⇒ $0 < x < 3$

ii). $x > 7$ ⇒ $7 < x < 10$

iii). $1 < x < 6$ ⇒ $1 < x < 6$

x_1	x_2	Probability
0	3	0.3
7	10	0.3
1	6	0.5

Parameters :-

x_2 = Upper limit

x_1 = lower limit

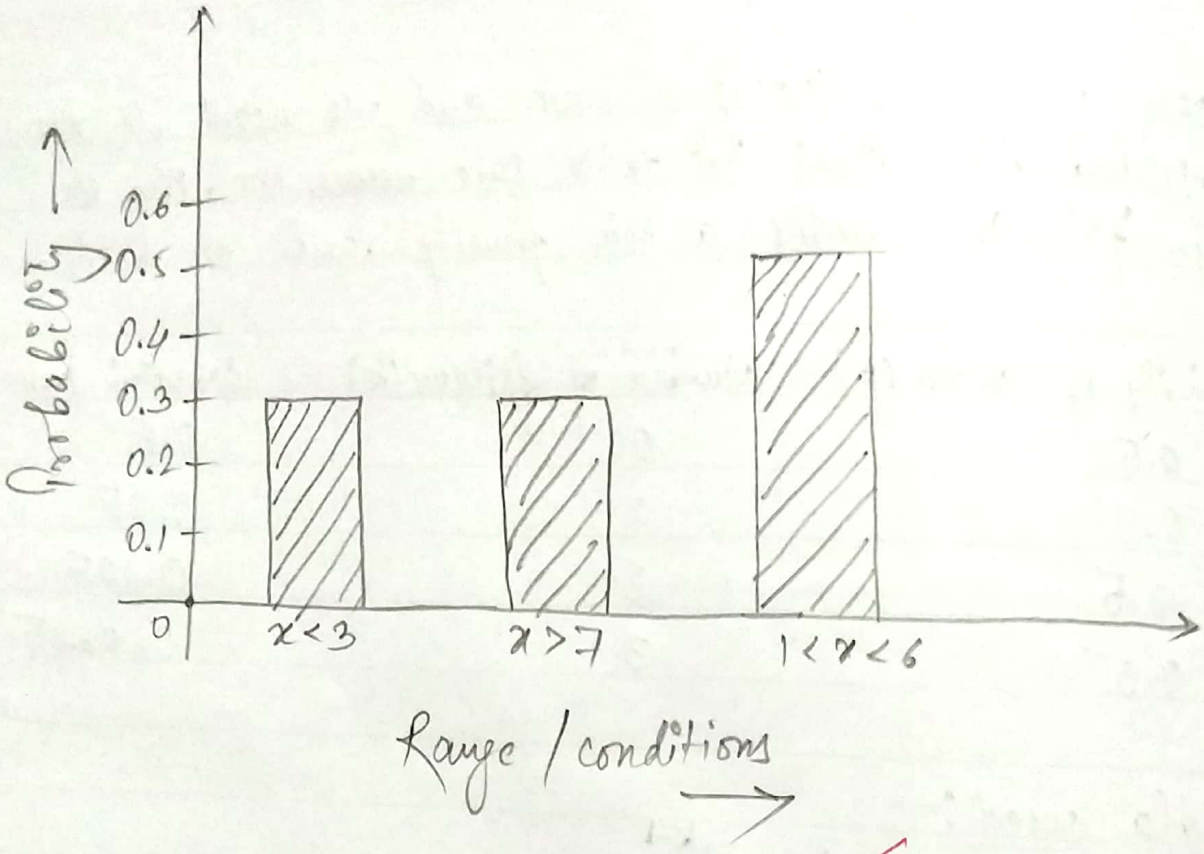
a = x value of range given.

b = y value of range given.

Formula used :-

$$\text{Probability} = \frac{1}{(b-a)} \cdot (x_2 - x_1)$$

DELTA



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Practical - 07 Fitting of Normal Distribution.

L.B	U.B	Mid-Value (x_i)	f_i	$f_i x_i$	$f_i x_i^2$	N.D
below	144	0	0	0	0	0
144	150	147	3	441	64827	0.0009
150	156	153	12	1836	280908	0.0094
156	162	159	23	3657	581463	0.0569
162	168	165	52	8580	1415700	0.2074
168	174	171	61	10431	1783701	0.4801
174	180	177	39	6903	1221831	0.7629
180	186	183	10	1830	334890	0.9307
186	above	0	0	0	0	0

$\Sigma f_i = 200$ $\Sigma f_i x_i = 33678$ $\Sigma f_i x_i^2 = 5683320$

Prob Z	E.F
0.0009	0.1855
0.0085	1.7081
0.0474	9.4918
0.1504	30.0968
0.2727	54.5483
0.2828	56.5638
0.1677	33.5598
0.0692	13.8456
0	0
$\Sigma P(z) = 1$	$\Sigma EF = 200$

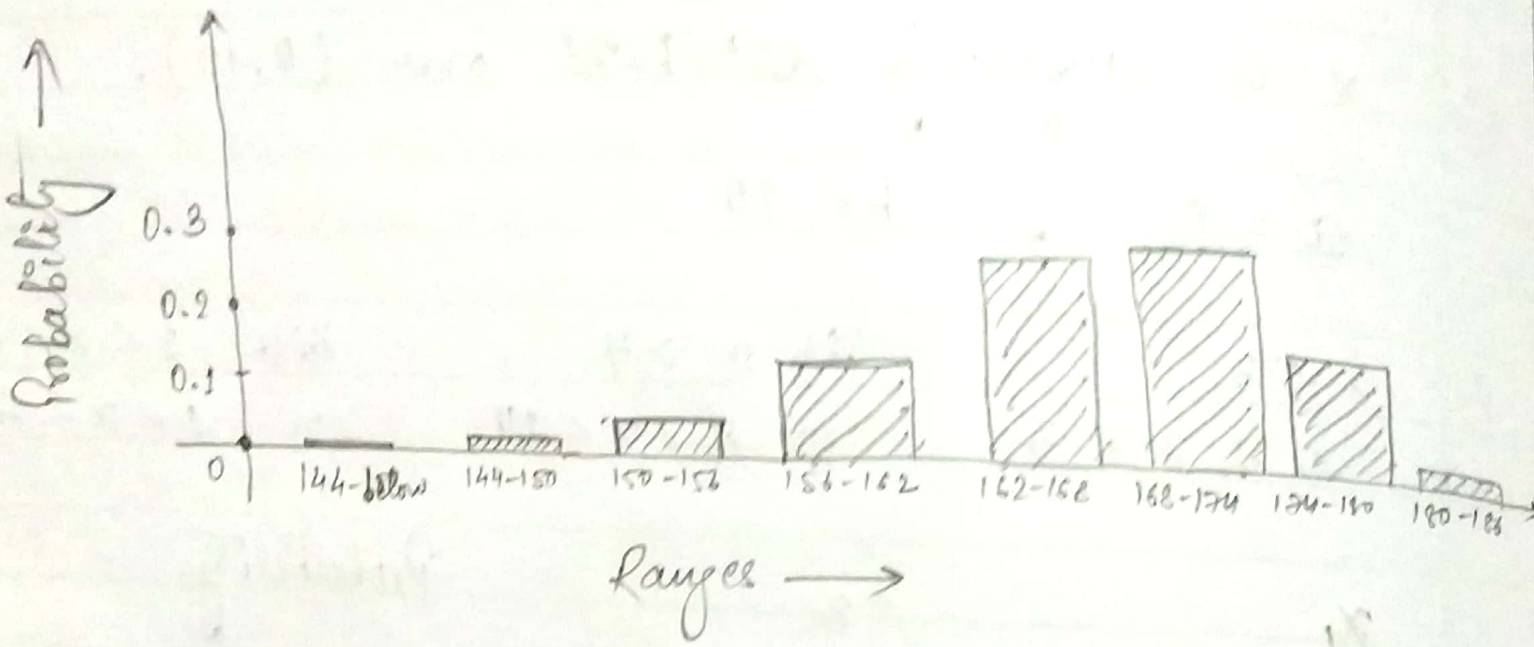
Mean: 168.39

Variance: 61.4079

S.D: 7.836319289

3/4/24

DELTA



Experiment :

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Practical - 02 Fitting of Multinomial Distribution

Q:- Suppose that a bag contains 8 balls, 3 red, 1 green, and 4 blue. You reach in the bag pull out a ball at random and then put the ball back in the bag and pull out another ball. This experiment is repeated 10 times. What is the probability that outcome will result in - i). exactly 4R and 6B ii). exactly 3R, 2G and 5B iii). exactly 5R, 3G, 2B iv). 2R, 6G, 2B?

x1	x2	x3	p1	p2	p3	Multinomial	p1^x1	p2^x2	p3^x3	Prob.
4	0	6	0.375	0.125	0.5	210	0.019	1	0.015	0.064
3	2	5	0.375	0.125	0.5	2520	0.052	0.015	0.031	0.064
5	3	2	0.375	0.125	0.5	2520	0.007	0.001	0.25	0.009
2	6	2	0.375	0.125	0.5	1260	0.140	0.0000038	0.25	0.00016

* ~~Formula Used:-~~
* Function Used:-

Multinomial(number1, number2).

* Formula used:-

$$f(x_1, \ldots x_k) = \frac{n!}{x_1! \cdot x_2! \cdot \ldots x_k!} p_1^{x_1} \cdot p_2^{x_2} \ldots p_k^{x_k}.$$

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Practical - 12 Bivariate Data

X	Y	Covariance	Correlation	SD(x)	SD(Y)
2	8	0.85	0.66022529	0.7211	1.7853
2.8	11				
4	12				
3.2	8				

* Functions Used.

i). COVARIANCE.P (array 1, array 2)
set of X, set of Y

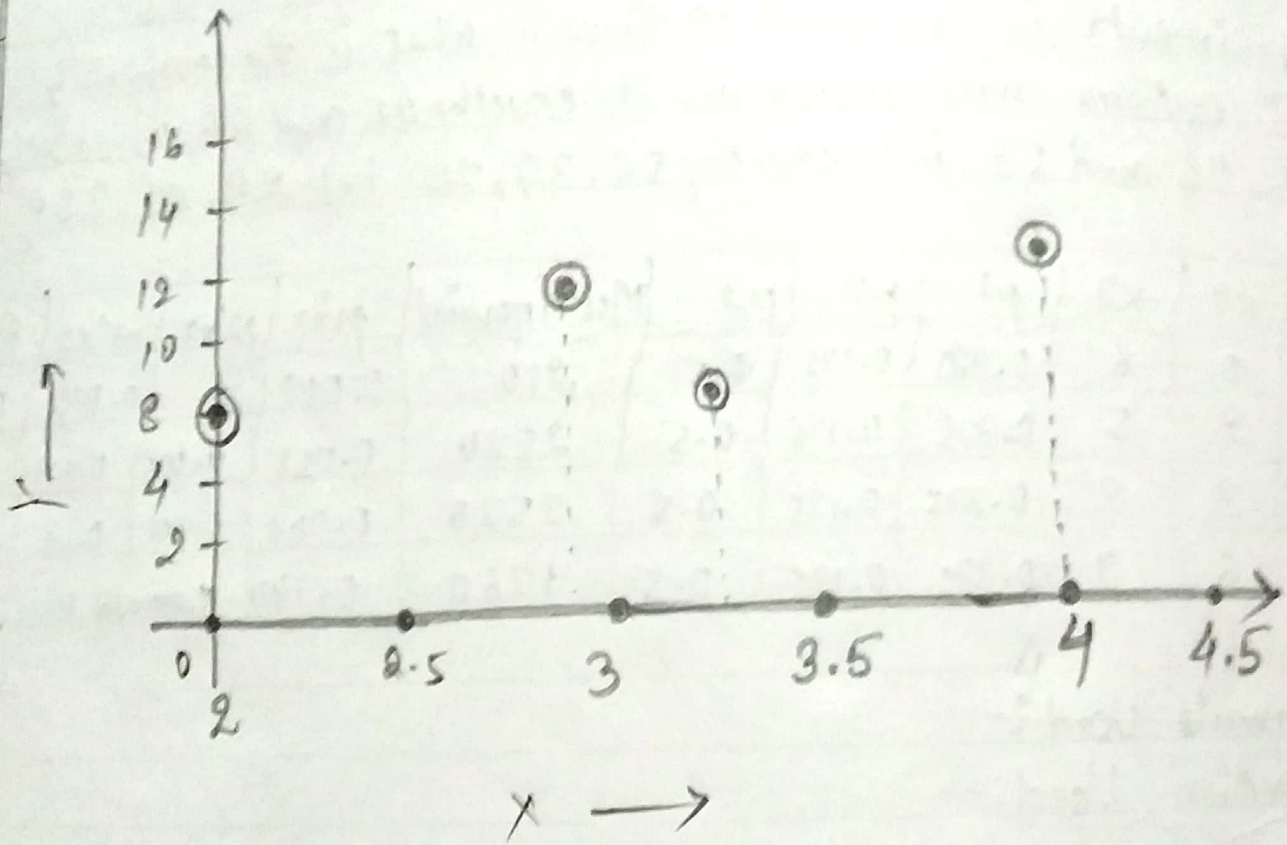
ii). CORREL (array 1, array 2)

iii). STDEV.P (number 1)

* Formula Used.

$$\text{Correlation} = \frac{\text{Covariance}}{S.D(x) * S.D(Y)}$$

DELTA



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Practical-13 Karl Pearson's correlation.

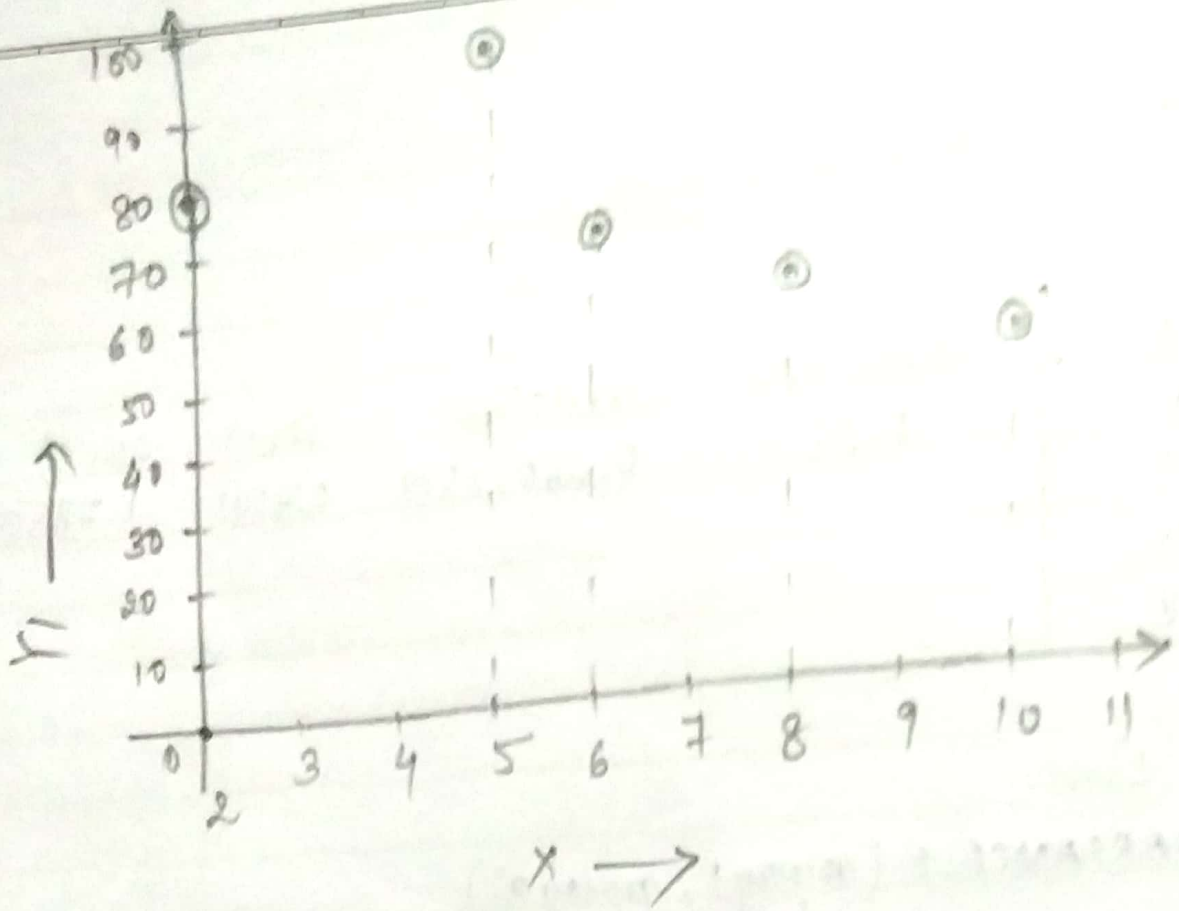
X	Y1	Y2
2	80	45
5	95	79
6	66	94
8	58	90
10	47	98

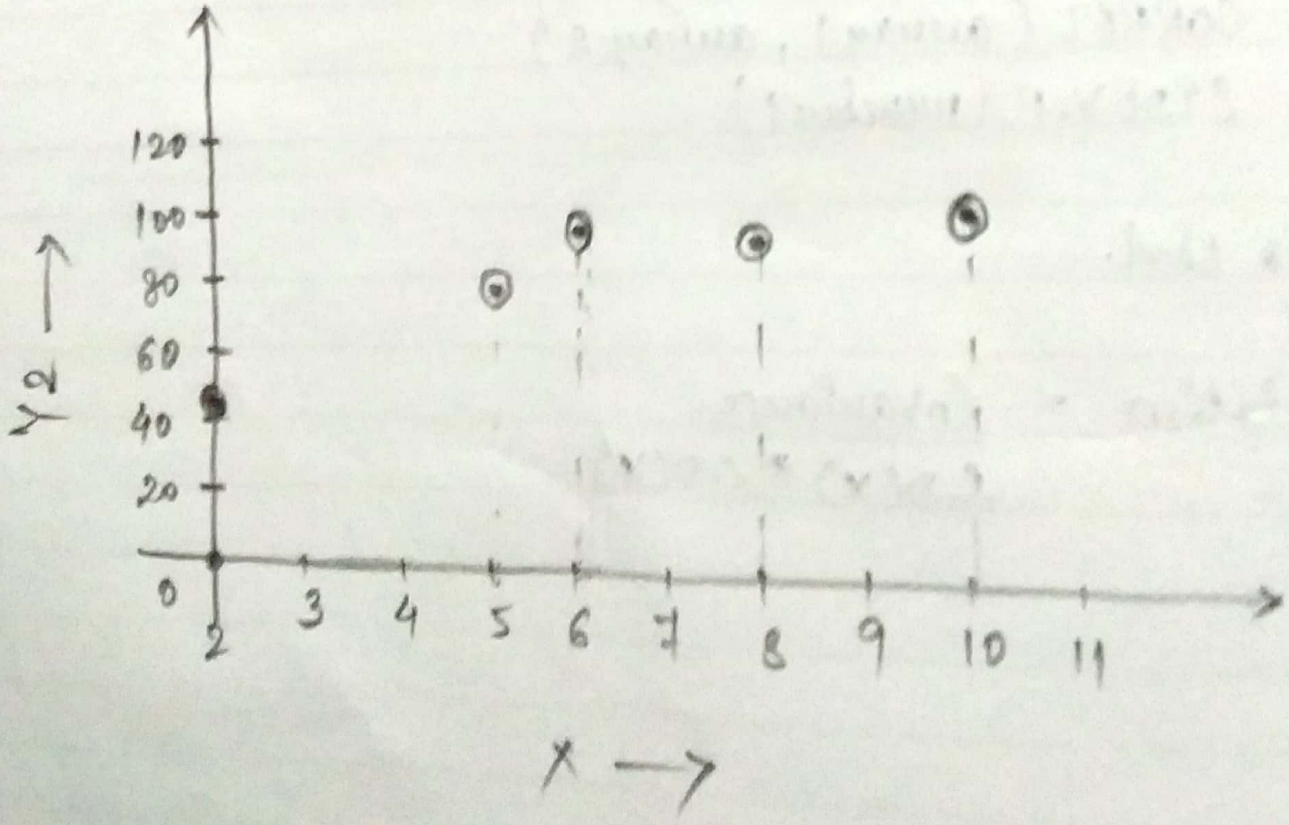
Pearson (x y1) - 0.79085

Pearson (x y2) 0.89109

* Function Used

PEARSON (array1, array2)
set of x, set of y1 & y2





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Practical - 10 Application problem on Poisson ~~Binomial~~ Distribution

Q: On average, 5 customers arrive at a store every hour. What is the probability that exactly 3 customers arrive in the next hour?

Arrival Average Rate (λ)	No. of Arrivals (x)	Probability
5	3	0.265025

* Function Used:-

⇒ POISSON.DIST (x, mean, cumulative)

Teacher's Signature

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Practical - 11 Application problem on Normal Distribution

Q: The average weight of bags of flour produced by a factory is 5 kg with S.D of 0.2 kg. If the weights are normally distributed, what is the probability that a randomly selected bag weighs between 4.8kg & 5.2kg?

Mean(μ)	S.D(σ)	Lower Bound	Upper Bound	Probability
5	0.2	4.8	5.2	0.682689

* Function used :-

* NORM.DIST(UB, mean, S.D, True) - NORM.DIST(LB, mean, S.D, True).

Teacher's Signature _____

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Practical-09 Application problem on Binomial Distribution

Q:- In a survey, 60% of the people prefer coffee over tea. If 10 people are randomly selected, what is the probability that exactly 7 of them prefer coffee?

No. of Trials (n)	Prob. of success (p)	No. of success (x)	Probability
10	0.6	7	0.2149908

* Function Used:-

* =BINOM.DIST(x, n, p, FALSE).

Teacher's Signature _____