

# Statistics Assignment

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Observations/Data:

Number of data = 100

0, 4, 6, 1, 5, 7, 8, 9, 10, 3  
 5, 2, 8, 7, 10, 5, 7, 2, 1, 0,  
 8, 1, 9, 7, 3, 1, 5, 2, 1, 6,  
 7, 4, 6, 5, 6, 7, 8, 9, 10, 0,  
 0, 3, 4, 8, 0, 3, 1, 4, 9, 0,  
 6, 8, 2, 2, 5, 0, 3, 1, 3, 9,  
 8, 8, 4, 4, 6, 6, 5, 2, 8, 7,  
 7, 6, 3, 9, 6, 5, 1, 2, 1, 6,  
 2, 3, 0, 5, 9, 8, 3, 6, 2, 1  
 1, 9, 2, 1, 6, 8, 1, 1, 0, 0

Frequency Distribution Table

Variable	Tally Marks	frequency	C.f
0	<del>    </del>	10	10
1		14	24
2		10	34
3		9	43
4		6	49

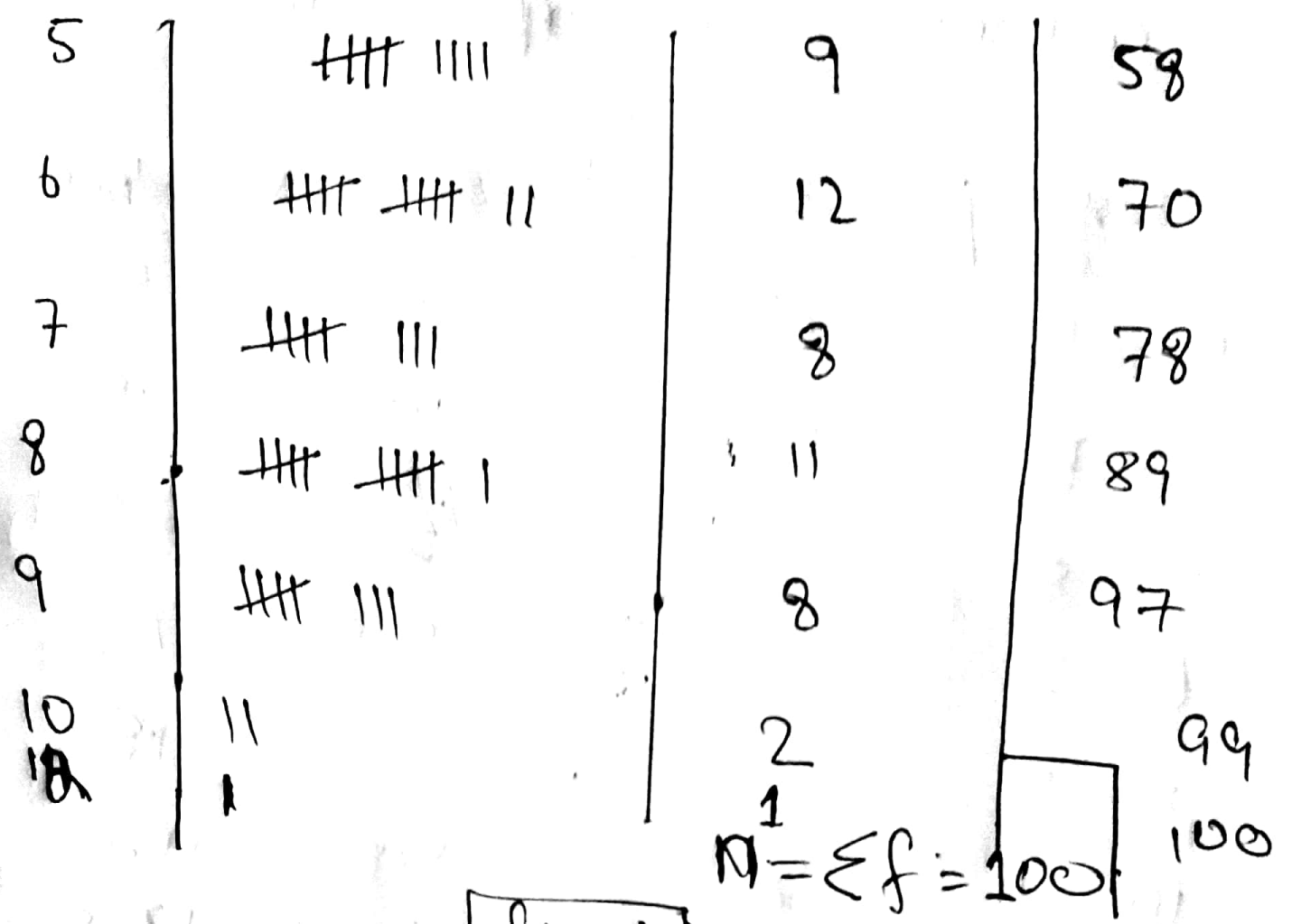


Fig A

Step #01

Range = Max - Min

Range = ~~12~~ - 0

Range = ~~12~~

Step #02

Number of classes (k)

$k = 1 + 3.3 \log(n)$

OR

$2^k \geq 100$

$k = 7$

Step # 02  

$$\text{interval} = i = \frac{\text{Range}}{k}$$

$$i = \frac{13}{7} = 1.714$$

$$i \approx 2$$

Discrete Grouped Frequency Distribution Table:

Classes	f	<del>Class</del> Boundaries
0 — 1	24	
2 — 3	19	
4 — 5	15	
6 — 7	20	
8 — 9	19	
10 — 11	2	
12 — 13	1	

$$n = \sum f = 100$$

# Continuous Class Boundaries Table

(4)

Class	f	Class Boundaries
0 - 1	24	-0.5 - 1.5
2 - 3	19	1.5 - 3.5
4 - 5	15	3.5 - 5.5
6 - 7	20	5.5 - 7.5
8 - 9	19	7.5 - 9.5
10 - 11	2	9.5 - 11.5
12 - 13	1	11.5 - 13.5

$n = \sum f = 100$

## Question #2

Finding averages of the above mentioned frequencies.

- Arithmetic Mean
- Geometric Mean
- Harmonic Mean
- Median
- Mode

interval	f	Mid point (m)	$f \times m$	$f \times \log m$	$f/m$
0 - 1	24	0.5	$24 \times 0.5 = 12$	$24 \times \log(0.5) = -7.22$	$24/0.5 = 48$
2 - 3	19	2.5	$19 \times 2.5 = 47.5$	$19 \times \log 2.5 = 7.56$	$19/2.5 = 7.6$
4 - 5	15	4.5	$15 \times 4.5 = 67.5$	$15 \times \log 4.5 = 9.80$	$15/4.5 = 3.33$
6 - 7	20	6.5	$20 \times 6.5 = 130$	$20 \times \log 6.5 = 16.25$	$20/6.5 = 3.08$
8 - 9	19	8.5	$19 \times 8.5 = 161.5$	$19 \times \log 8.5 = 17.66$	$19/8.5 = 2.23$
10 - 11	2	10.5	$2 \times 10.5 = 21$	$2 \times \log 10.5 = 2.04$	$2/10.5 = 0.19$
12 - 13	1	12.5	$1 \times 12.5 = 12.5$	$1 \times \log 12.5 = 1.1$	$1/12.5 = 0.08$
	$\Sigma f = 100$		$\Sigma (f \times m) = 452$	$\Sigma (f \times \log m) = 27.19$	$\Sigma f/m = 64.51$

Arithmetic Mean

$$A.M = \frac{\Sigma f_m}{\Sigma f} = \frac{452}{100}$$

$$A.M = 4.52$$

## Geometric Mean

$$G.M = \text{Antilog} \left( \frac{\sum f \times \log m}{\sum f} \right)$$

$$G.M = \text{Antilog} \left( \frac{47.19}{100} \right)$$

$$G.M = 2.964$$

## Harmonic Mean

$$H.M = \frac{\sum f}{\sum (f/m)}$$

$$H.M = \frac{100}{64.51}$$

$$H.M = 1.55$$

$$A.M \geq G.M \geq H.M$$

$$4.52 > 2.964 > 1.55$$



## Median and Mode

Median  $\Rightarrow$  the Central Value

$$n = 100 \text{ (Even)}$$

$$\text{Median} = \frac{n}{2} \text{th term}$$

$$\text{Median} = \frac{100}{2} \text{th term}$$

$$\text{Median} = 50 \text{th term}$$

From the frequency distribution table in fig A we can see that the 50th term is 5.

So  $\boxed{\text{Median} = 5}$

## Mode

Mode is the most frequent term. By check frequency distribution table we can see that the most frequent term is 1 with frequency = 14.

So  $\boxed{\text{Mode} = 1}$



### Question # 3

Finding Quartiles of the D.F.D Table

Class	f	CF	
0 - 1	24	24	
2 - 3	19	43	→ First Quartile Class
4 - 5	15	58	→ 2nd Quartile Class
6 - 7	20	78	→ 3rd Quartile Class
8 - 9	19	97	
10 - 11	2	99	
12 - 13	1	100	

$$Q_1 = L_{Q_1} + \left( \frac{\sum f/4 - CF_{Q_1-1}}{f_{Q_1}} \right) \cdot C \cdot Q_1$$

$$\sum f/4 = \frac{100}{4} = 25$$

$$L_{Q_1} = 2$$

$$C_{Q_1} = 1$$

$$f_{Q_1} = 19$$

$$cf_{Q_{1-1}} = 24$$

$$Q_1 = L_{Q_1} + \left( \frac{\sum f/4 - cf_{Q_{1-1}}}{f_{Q_1}} \right) \cdot C_{Q_1}$$

$$Q_1 = 2 + \left( \frac{25 - 24}{19} \right) \cdot 1$$

$$Q_1 = 2.05$$

$$Q_1 \approx 2$$

2nd Quartile

~~Q<sub>2</sub>~~

$$Q_2 = L_{Q_2} + \left( \frac{2 \sum f/4 - cf_{Q_2-1}}{f_{Q_2}} \right) \cdot C_{Q_2}$$

$$\frac{2 \sum f}{4} = \frac{2(100)}{4} = 50$$

2nd Quartile

~~3rd~~ class

is

4-5  
of 15

having frequency

$$LQ_2 = 4$$

$$CQ_2 = 1$$

$$fQ_2 = 15$$

$$cfQ_{2-1} = 43$$

$$Q_2 = 4 + \left( \frac{50 - 43}{15} \right) \cdot 1$$

$$Q_2 = 4.466$$

$$Q_2 \approx 4$$

3rd Quartile

$$Q_3 = LQ_3 + \left( \frac{3 \sum f/4 - cfQ_{3-1}}{fQ_3} \right) \cdot CQ_3$$

$$\textcircled{1} \quad 3 \sum f/4 = \frac{3 \times 100}{4} = 75$$

3rd Quartile class is 6-7

having frequency of 20

$$LQ_3 = 6$$

$$CQ_3 = 1$$

$$fQ_3 = 20$$

$$cfQ_{3-1} = 58$$

$$Q_3 = 6 + \left( \frac{75 - 58}{20} \right) \cdot 1$$

$$Q_3 = 6 + 0.85$$

$$Q_3 = 6.85$$

$$Q_3 \approx 7$$

Question #04

Range

$$\text{Range} = \text{Max} - \text{Min}$$

$$\text{Range} = 12 - 0$$

$$\text{Range} = 12$$

## Quartile Range

$$Q. \text{ Range} = Q_3 - Q_1$$

$$Q. \text{ Range} = 7 - 2$$

$$Q. \text{ Range} = 5$$

## Semi inter Quartile Range

$$S. I. Q. R = \frac{Q_3 - Q_1}{2}$$

$$S. I. Q. R = \frac{7 - 2}{2} = \frac{5}{2}$$

$$S. I. Q. R = 2.5$$

Interval	f	X (M.P)	f * X	Mean $\bar{X}$	X - $\bar{X}$	(X - $\bar{X}$ ) <sup>2</sup>	f(X - $\bar{X}$ ) <sup>2</sup>
0 - 1	24	0.5	12	4.52	-4.02	<del>16.16</del>	387.84
2 - 3	19	2.5	47.5	4.52	-2.02	4.08	77.52
4 - 5	15	4.5	67.5	4.52	-0.02	0.0004	0.006
6 - 7	20	6.5	130	4.52	1.98	3.92	78.4
8 - 9	19	8.5	161.5	4.52	3.98	15.84	300.96
10 - 11	2	10.5	21	4.52	5.98	35.76	71.52
12 - 13	1	12.5	12.5	4.5	7.98	63.68	63.68
	$\Sigma f = 100$		$\Sigma fX = 452$			$\Sigma (X - \bar{X})^2 = 139.44$	$\Sigma f(X - \bar{X})^2 = 979.926$

$$\text{Variance} = \sigma^2 = \frac{\Sigma f(X - \bar{X})^2}{\Sigma f - 1} = \frac{979.926}{100 - 1} = \frac{979.926}{99}$$

$$\text{Variance} = \sigma^2 = 9.899$$

# Standard Deviation

$$\text{Standard Deviation} = s = \sqrt{\text{Variance}}$$

$$s = \sqrt{9.898}$$

$$\text{Standard Deviation} = s = 3.146$$

# Coefficient of Variation

$$C.V = \frac{s.d}{\bar{x}} \times 100$$

$$C.V = \frac{3.146}{4.52} \times 100$$

$$CV = 69.6$$