

Statistics Assignment_26_8_25

9, 12, 13, 16, 19, 12, 18, 0, 9, 12, 6

X	f
6	5
1	2
10	5
12	9
14	10

X	f
10-20	10
20-30	12
30-40	12
40-50	17
50-60	19
60-70	22

6, 9, 11, 16, 12, 14, 12, 17, 20, 23, 26

Mean $\bar{X} = \frac{\sum X}{n}$

Median even, $\frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$

odd, $\left(\frac{n+1}{2}\right)^{\text{th}} \text{ term}$

Mode = most frequent term.

Data

X = 9, 12, 13, 16, 19, 12, 18, 0, 9, 12, 6

$$\text{Mean} = \frac{\sum_{i=1}^n X_i}{n} = \frac{9+12+13+16+19+12+18+0+9+12+6}{11} = \frac{126}{11} = 11.4545 \approx 11.46$$

Mode = 12

Median = odd = $\left(\frac{n+1}{2}\right)^{\text{th}} \text{ Term} \Rightarrow \left(\frac{11+1}{2}\right) = \frac{12}{2} = 6$

Sorted list \rightarrow 0, 6, 9, 9, 12, 12, 12, 13, 16, 18, 19

Median = 12

Mode : frequent Repeated \rightarrow 12

Mode = 12

$$\text{Range} = \max(x) - \min(x)$$

$$= (19) - (0)$$

$$\boxed{\text{Range} = 19}$$

Variance & Standard Deviation.

$$\text{Mean } (\bar{x}) = 11.46$$

$$\text{Variance } \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{N}$$

$$\begin{aligned} \sigma^2 &= (9-11.46)^2 + (12-11.46)^2 + (13-11.46)^2 + (16-11.46)^2 \\ &+ (19-11.46)^2 + (12-11.46)^2 + (18-11.46)^2 + (0-11.46)^2 \\ &+ (9-11.46)^2 + (12-11.46)^2 + (6-11.46)^2 / 11 \end{aligned}$$

$$\sigma^2 = (296.436) / 11$$

$$\boxed{\sigma^2 = 26.9487 \approx 27}$$

$$S.D = \sqrt{\sigma^2} = \sqrt{27} = 5.19$$

$$\boxed{S.D = 5.19}$$

x	f
6	5
1	2
10	5
12	9
14	10

$$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i} = \frac{30 + 2 + 50 + 108 + 140}{31} = \frac{330}{31} \approx 10.64$$

$$= \frac{1039}{97} = 10.71135 \approx 10.71$$

$$\boxed{\text{Mean} \approx 10.64}$$

$$\boxed{\text{Mean} \approx 10.64}$$

$$\text{Median} = L + \left(\frac{\frac{N}{2} - CF}{f_m} \right) \times h$$

L - Lower Boundary of Median class

N = $\sum f$ (Total frequency)

CF = Cumulative freq before the median class

f_m = freq of the median class

h = class width

Sorted \Rightarrow

x	f	cf
1	2	2
6	5	7
10	5	12
12	9	21 \leftarrow
14	10	31

$$N = \sum f = 2 + 5 + 5 + 9 + 10$$

$$= 22 + 9 = 31$$

$$\boxed{N = 31}$$

$$CF = 12 \quad \frac{N}{2} = 15.5$$

$$L = \frac{10 + 12}{2} = \frac{22}{2} = 11$$

$$U = \frac{8 + 12 + 9}{2} = 13$$

$$h = 13 - 11 = 2$$

$$\boxed{h = 2}$$

$$f_m = 9$$

$$\text{Median} = 11 + \left(\frac{15.5 - 12}{9} \right) \times 2$$

$$\text{Median} = 11.78$$

$$\boxed{\text{Median} \approx 11.78}$$

$$\text{Mode} \Rightarrow f_{10} = 14$$

Number of Highest frequency 10 times = 14

$$\boxed{\text{Mode} = 14}$$

Range:

$$\text{Range} = \text{max}(x) - \text{min}(x)$$

$$= 14 - 1 = 13$$

$$\boxed{\text{Range} = 13}$$

Variance:

$$\begin{aligned} \sigma^2 &= \frac{\sum fx^2}{N} - \bar{x}^2 \\ &= \frac{3938}{51} - (10.64)^2 \end{aligned}$$

$$\boxed{\sigma^2 = 13.74}$$

$$(1)^2 \times 2 = 2$$

$$(5)^2 \times 5 = 180$$

$$(10)^2 \times 5 = 500$$

$$(12)^2 \times 7 = 1008$$

$$(14)^2 \times 10 = 1960$$

$$S.D = \sqrt{\sigma^2} = \sqrt{13.74}$$

$$\boxed{S.D = 3.708}$$

X	F
10-20	10
20-30	16
30-40	12
40-50	17
50-60	19
60-70	22

class	x_i	f_i	$f_i x_i$
10-20	15	10	150
20-30	25	16	400
30-40	35	12	420
40-50	45	17	765
50-60	55	19	1045
60-70	65	22	1480
$\Sigma f_i = 96$			4210

CF

10
26
38
55

Mean: $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{4210}{96} = 43.8541667$

$\bar{x} = 43.85$ approx

Median:

$$\text{Median} = L + \left(\frac{\frac{N}{2} - CF}{f} \right) \times h$$

$N = 96$

$N/2 = 96/2 = 48$

48 falls in 40-50

$L = 40$ $CF = 38$ $f = 17$ $h = 10$

$= 40 + \left(\frac{48 - 38}{17} \right) \times 10$

$= 40 + \left(\frac{10}{17} \right) \times 10$

$= 40 + 5.88$

Median ≈ 45.88

$\frac{48}{55}$
10

Mode:-

$$\text{Mode} = L + \left(\frac{f_m - f_1}{2f_m - f_1 - f_2} \right) \times h$$

f_m = freq of Modal class (largest)

f_1 = freq of prev class

f_2 = freq of Next class

L = Lower Limit of Modal class

Here, $f_m = 22$ $f_1 = 19$ $f_2 = 6$ $L = 60$ $h = 10$

$$= 60 + \left(\frac{22 - 19}{2(22) - 19 - 6} \right) \times 10$$

$$= 60 + \left(\frac{3}{25} \right) \times 10$$

$$= 60 + \frac{6}{5} = 60 + 1.2 = 61.20$$

$$\boxed{\text{Mode} \approx 61.20}$$

Range
To-10
= 60

$$\begin{array}{r} 3 \\ 14 \\ 19 \\ \hline 27.25 \\ 5 \overline{) 136} \\ 10 \\ \hline 36 \\ 35 \\ \hline 10 \end{array}$$

Variance & S.D :-

$$\sigma^2 = \frac{\sum f_i (x_i - \bar{x})^2}{\sum f_i} \quad \text{S.D } (\sigma) = \sqrt{\sigma^2}$$

$$(15 - 43.85)^2 = 818.82 \times 10$$

$$(25 - 43.85)^2 = 365.22 \times 16$$

$$(35 - 43.85)^2 = 78.82 \times 12$$

$$(45 - 43.85)^2 = 1.32 \times 17$$

$$(55 - 43.85)^2 = 124.52 \times 19$$

$$(65 - 43.85)^2 = 445.72 \times 22$$

$$\sigma^2 = \frac{26998.8}{96} = 281.2$$

$$\sigma = \sqrt{281.2} \approx 16.77$$

$$\boxed{\sigma = 16.77}$$

$$x = [6, 9, 11, 12, 12, 14, 16, 19, 20, 23, 26]$$

$$\text{Mean} = \frac{\sum_{i=1}^n x_i}{n} = \frac{168}{11} = 15.2727273$$

$$\boxed{\text{Mean} \approx 15.27}$$

$$\text{Median} = \frac{11+1}{2} = \frac{12}{2} = 6$$

Sorted \Rightarrow Already Sorted \checkmark

$$6^{\text{th}} \text{ Term} \Rightarrow 14$$

$$\boxed{\text{Median} = 14}$$

$$\text{Mode} \Rightarrow \text{No. of freq. term} \Rightarrow 12$$

$$\boxed{\text{Mode} = 12}$$

$$\text{Range} \Rightarrow 26 - 6 = 20 \Rightarrow \boxed{\text{Range} = 20}$$

$$\text{Variance } \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n} = \frac{378.17}{11} \approx 34.38$$

$$\boxed{\text{Variance} \approx 34.38}$$

$$S.D. = \sqrt{\sigma^2} = \sqrt{34.38}$$

$$\boxed{S.D. \approx 5.86}$$

$$\begin{aligned} & (-7.27)^2 (6 - 15.27)^2 \\ & + \\ & (-6.27)^2 (9 - 15.27)^2 \\ & + \\ & (11 - 15.27)^2 \\ & + \\ & (12 - 15.27)^2 \\ & + \\ & (12 - 15.27)^2 \\ & + \\ & (14 - 15.27)^2 \\ & + \\ & (16 - 15.27)^2 \\ & + \\ & (19 - 15.27)^2 \\ & + \\ & (20 - 15.27)^2 \\ & + \\ & (23 - 15.27)^2 \\ & + \\ & (26 - 15.27)^2 \end{aligned}$$