Chapter-6 Swati Prakashan

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# Measures of Central Tendency

## Computation of Median

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(i)

| Size (X) | f | Cumulative frequency (cf) |
|---|---|---|
| 8 | 3 | 3 |
| 10 | 7 | 10 |
| 12 | 12 | 22 |
| 14 | 28 | 50 |
| 16 | 10 | 60 |
| 18 | 9 | 69 |
| 20 | 6 | 75 |
| | $\Sigma f = 75$ | |

$M =$ Size of $\left(\frac{N+1}{2}\right)^{th}$ item

$=$ Size of $\left(\frac{75+1}{2}\right)^{th}$ item.

$=$ Size of $38^{th}$ item.

It is clear from the cumulative frequency column that median size item 38 lies in 50 C.F. & its corresponding size is 14,

So, Median $= 14$

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(ii) First arrange the series in ascending order

| X | f | cf |
|---|---|---|
| 5 | 3 | 3 |
| 7 | 5 | 8 |
| 10 | 15 | 23 |
| 12 | 12 | 35 |
| 20 | 4 | 39 |
| | $\Sigma f = 39$ | |

$M =$ Size of $\left(\frac{N+1}{2}\right)^{th}$ item.

$=$ Size of $\left(\frac{39+1}{2}\right)^{th}$ item.

$=$ Size of $20^{th}$ item.

It is clear from C.F. that median size item 20 lies in 23 C.F. & its corresponding size is 10

So, Median $= 10$

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(iii) First arrange the series in ascending order.

| Size x | f | cf |
|---|---|---|
| 18 | 12 | 12 |
| 19 | 15 | 27 |
| 20 | 18 | 45 |
| 21 | 16 | 61 |
| 22 | 10 | 71 |
| 23 | 6 | 77 |
| 24 | 2 | 79 |
| | $\Sigma f = 79$ | |

$M =$ size of $\left(\frac{N+1}{2}\right)^{th}$ item.

$= $ size of $\left(\frac{79+1}{2}\right)^{th}$ item.

$=$ size of $40^{th}$ item.

It is clear from C.F. that median size item 40 lies in 45 C.F. & its corresponding size is 20

So, Median = 20

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(iv)

| X | f | Cf |
|---|---|---|
| 10 | 2 | 2 |
| 20 | 3 | 5 |
| 30 | 4 | 9 |
| 40 | 0 | 0 |
| 50 | 5 | 14 |
| 60 | 6 | 20 |
| 70 | 3 | 23 |
| 80 | 2 | 25 |
| 90 | 1 | 26 |
| 100 | 4 | 30 |

$M =$ Size of $\left(\frac{N+1}{2}\right)^{th}$ item.

$=$ Size of $\left(\frac{30+1}{2}\right)^{th}$ item

$=$ Size of $\left(\frac{31}{2}\right)^{th}$ item

$=$ Size of $15.5^{th}$ item

It is clear from C.F. that median size item 15.5 lies in 20 CF & its corresponding size is 60

So, Median $= 60$

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(i)

| C.I | f | cf |
|---|---|---|
| 5-15 | 4 | 4 |
| 15-25 | 6 | 10 c |
| 25-35 | 10 (f) | 20 ← |
| 35-45 | 5 | 25 |
| 45-55 | 3 | 28 |
| 55-65 | 2 | 30 |
| | $\Sigma f = 30$ | |

$$m = \text{Size of } \left(\frac{N}{2}\right)^{th} \text{ item.}$$

$$= \text{Size of } \frac{30}{2}^{th} \text{ item}$$

$$= \text{Size of } 15^{th} \text{ item.}$$

$15^{th}$ item lies in $20^{th}$ Cumulative frequency, therefore 25-35 will be median class.

$$M = L + \frac{i}{f}(m - c)$$

$$M = 25 + \frac{10}{10}(15 - 10).$$

$$M = 25 + 5$$

$$M = 30$$

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(ii)

$L_1 = 20$ , $i = 10$ , $f = 8$

$m = 12$ , $C = 8$

$$M = L_1 + \frac{i}{f}(m - c)$$

$$= 20 + \left\{\frac{10}{8}(12 - 8)\right\}$$

$$= 20 + \left\{\frac{10}{8} \times 4\right\}$$

$$M = 20 + \frac{10}{2}$$

$$M = 20 + 5$$

Median, $M = 25$

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(iii)

| X | f | cf |
|---|---|---|
| 20–40 | 6 | 6 |
| 40–60 | 9 | 15 |
| 60–80 | 11 | 26 |
| 80–100 | 14 | 40 (c) |
| 100–120 | 20 (f) | 60 |
| 120–140 | 15 | 75 |
| 140–160 | 10 | 85 |
| 160–180 | 8 | 93 |
| 180–200 | 7 | 100 |
| | $\Sigma f = 100$ | |

$m$ = size of $\frac{N}{2}$ th item

= size of $\frac{100}{2}$ th item

= size of 50th item

50th item lies in 60 cumulative frequency, therefore median class will be 100 – 120

$$M = L + \frac{i}{f}(m - c)$$

$$M = 100 + \frac{20}{20}(50 - 40)$$

$$M = 100 + 1(10)$$

$$M = 110$$

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33/(iv)

Subtract (0.5) from all L1 & add (0.5) in all L2

Age

| (X) | (f) | (Cf) |
|---|---|---|
| 9.5 – 19.5 | 6 | 6 |
| 19.5 – 29.5 | 15 | 21 (c) |
| 29.5 – 39.5 | 12 (f) | 33 |
| 39.5 – 49.5 | 10 | 43 |
| 49.5 – 59.5 | 6 | 49 |
| 59.5 – 69.5 | 3 | 52 |
| | $\Sigma f = 52$ | |

$m =$ Size of $\left(\frac{N}{2}\right)^{th}$ item

$m =$ Size of $\frac{52}{2}$ th item

$m =$ size of 26 th item

26th item lies in 33 CF, so median class will be 29.5 – 39.5

$M = L_1 + \frac{i}{f}(m - c)$

$= 29.5 + \frac{10}{12}(26 - 21)$

$= 29.5 + \left\{\frac{10}{12} \times 5\right\}$

$M = 29.5 + 4.17$

$M = 33.67.$

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