Quartiles, Percentiles, Deciles Mode

Find the three quartiles for the following data:

x	15	20	25	30	35	40	45	50
f	7	15	19	23	20	15	8	5

≤ cf	7	22	41	64	84	99	107	112

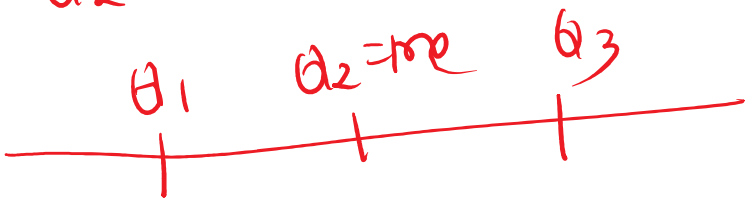
$N = 112$, $\frac{N}{4} = \frac{112}{4} = 28$, $\frac{3N}{4} = 3 \times 28 = 84$

$Q_1 = 25$, $Q_3 = 40$

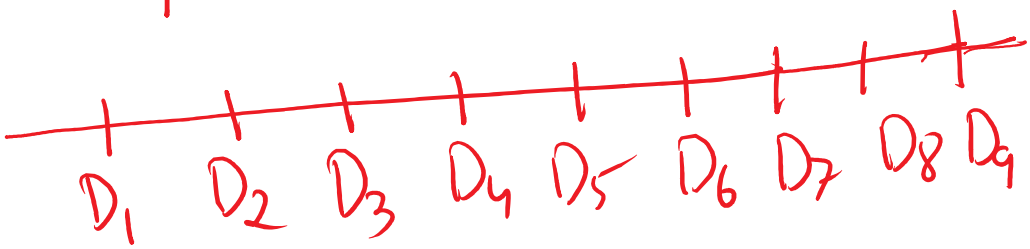
$Q_2 = Me$ $\quad \frac{N}{2} = \frac{112}{2} = 56$

$Q_2 = Me = 30$

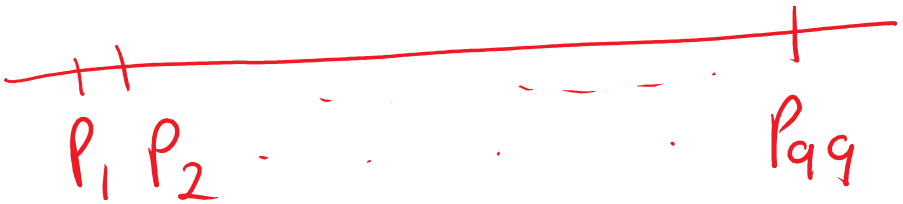
Quartiles



Deciles



Percentiles



Q_1, Q_2, Q_3

$$D_i = l_1 + \frac{(l_2 - l_1)\left(\frac{iN}{10} - cf\right)}{f}$$

$$P_i = l_1 + \frac{(l_2 - l_1)\left(\frac{iN}{100} - cf\right)}{f}$$

Find the three quartiles, D4, P80 for the following data:

CI	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55
f	12	28	36	50	25	18	16	10	5

Sol:

$\leq cf$ | 12 | 40 | 76 | 126 | 151 | 169 | 185 | 195 | 200

Sol: $Q_1, Q_2, Q_3, D_4, P_{80}$

$N = 200, \quad \frac{N}{4} = \frac{200}{4} = 50$

$(20-25) \rightarrow Q_1$ class

$$Q_1 = l_1 + \frac{(l_2 - l_1)\left(\frac{N}{4} - cf\right)}{f}$$

$$= 20 + \frac{5(50-40)}{36} = 21.39$$

$Q_2 = Me, \quad Q_3$

D_4

$$D_4 = l_1 + \frac{(l_2 - l_1)\left(\frac{4N}{10} - cf\right)}{f}$$

$\frac{4N}{10} = \frac{4 \times 200}{10} = 80$

$$= 25 + \frac{5(80-76)}{50}$$

10 - 10 = 80

50

$= 25.4$

$$P_{80} = l_1 + \frac{(l_2 - l_1)\left(\frac{80N}{100} - cf\right)}{f}$$

$$\frac{80N}{100} = \frac{80 \times 200}{100} = 160$$

$$= 35 + \frac{5(160 - 151)}{18}$$

$$= 37.5$$

Mode The value which repeats maximum number of times in the data

Find the Mode for the following

64,69,72,72,75,65

(ungrouped data)

Mode = 72

Find the Mode for following

X	1	2	3	4	5	6	7	8
Freq.	5	6	5	10	8	4	3	2

(grouped discrete data)

Mode = 4

x	10	20	30	40	50	60	70	80
Freq	4	10	10	12	12	4	6	7

Two modes-40,50

Grouped Continuous data

$$Mo = l_1 + (l_2 - l_1)\left(\frac{f_1 - f_0}{}\right)$$

$$M_o = l_1 + \frac{(l_2 - l_1)(f_1 - f_0)}{2f_1 - f_0 - f_2}$$

l_1 = LCI of Mode class

l_2 = UCI ....

f_1 = freq of pre mode class

f_0 = " " post mode "

f_2 = ...

Find the Mode for following

Marks	0-10	10-20	20-30	30-40	40-50
Number of Student(freq)	12	13	21	19	15

(20-30) → Mode class

$l_1 = 20$, $l_2 = 30$, $f_1 = 21$, $f_0 = 13$, $f_2 = 19$

$$M_o = l_1 + \frac{(l_2 - l_1)(f_1 - f_0)}{2f_1 - f_0 - f_2}$$

$$= 20 + \frac{10(21 - 13)}{2 \times 21 - 13 - 19}$$

$$= 20 + \frac{10 \times 8}{10}$$

$$= 28$$

For the following distribution of weights of 60 students, find Mode.

Weights in Kgs:	30-34	35-39	40-44	45-49	50-54	55-59	60-64
No. of students:	3	5	12	18	14	6	2

Weights in Kgs:	30-34	35-39	40-44	45-49	50-54	55-59	60-64
No. of students:	3	5	12	18	14	6	2

Wt.	Frq.	New CI
30-34	3	29.5 - 34.5
35-39	5	34.5 - 39.5
	f_0 12	39.5 - 44.5
	f_1 18	44.5 - 49.5 (l_1, l_2)
	f_2 14	49.5 - 54.5
	6	54.5 - 59.5
	2	59.5 - 64.5

$$M_0 = l_1 + \frac{(l_2 - l_1)(f_1 - f_0)}{2f_1 - f_0 - f_2}$$

$$= 44.5 + \frac{5(18 - 12)}{2 \times 18 - 12 - 14}$$

$$= 47.5$$

If the mode for the following distribution is 130, find the missing frequency.

Class Interval:	60-75	75-90	90-105	105-120	120-135	135-150
Frequency:	3	3	6	… a	7	6

(120 - 135) → mo class

$l_1 = 120$, $l_2 = 135$, $f_1 = 7$

$f_0 = a$ $f_2 = 6$

$$M_0 = l_1 + \frac{(l_2 - l_1)(f_1 - f_0)}{2f_1 - f_0 - f_2}$$

$$\Rightarrow 130 = 120 + \frac{15(7-a)}{2\times 7 - a - 6}$$

$$\Rightarrow 10 = \frac{15(7-a)}{8-a}$$

$$\Rightarrow 10(8-a) = 15(7-a)$$

$$\Rightarrow 80 - 10a = 105 - 15a$$

$$\Rightarrow -10a + 15a = 105 - 80$$

$$\Rightarrow 5a = 25$$

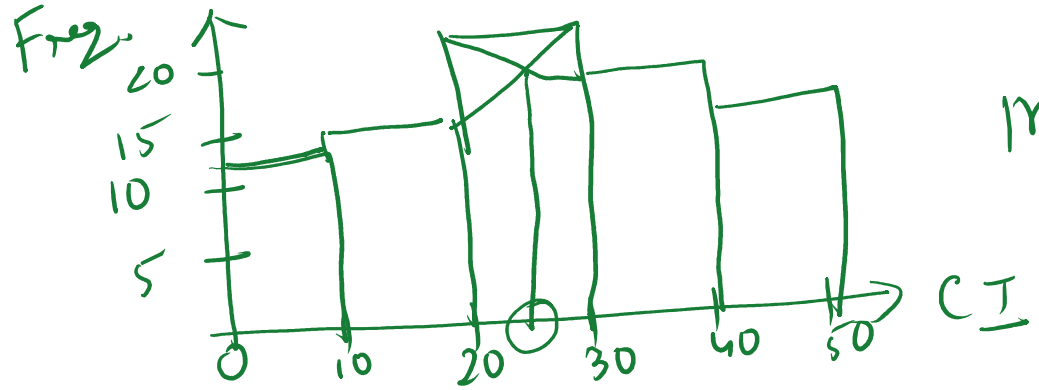
$$\Rightarrow a = \frac{25}{5} = 5$$

Find the Mode for following data graphically

Marks	0-10	10-20	20-30	30-40	40-50
Number of Student(freq)	12	13	21	19	15

Scale x-axis 10 units
y-axis 5

Histogram



$M_0 = 25$