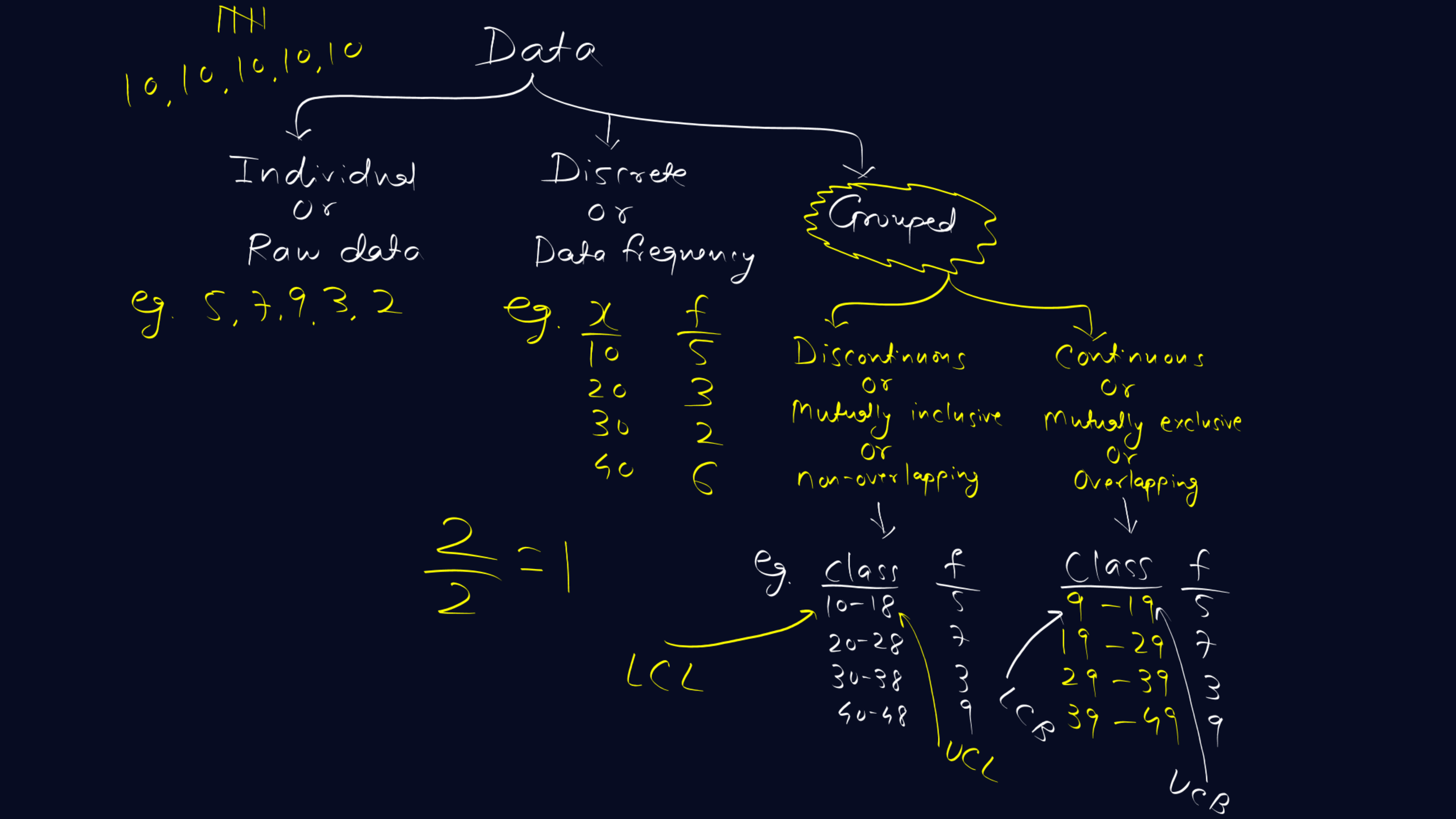

10, 10, 10, 10, 10
Data
Individual
or
Raw data
eg. 5, 7, 9, 3, 2
Discrete
or
Data frequency
eg.
x | f
10 | 5
20 | 3
30 | 2
40 | 6
Grouped
Discontinuous
or
Mutually inclusive
or
non-overlapping
Continuous
or
Mutually exclusive
or
Overlapping
2/2 = 1
eg.
Class | f
10-18 | 5
20-28 | 7
30-38 | 3
40-48 | 9
LCL
UCL
Class | f
9 - 19 | 5
19 - 29 | 7
29 - 39 | 3
39 - 49 | 9
LCB
UCB

(I) Individual Data

Steps: (1) Rearrange the given data in ascending order.

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

n = no. of observations

Quartiles (Q_1, Q_2, Q_3)

$Q_1 = \left(\frac{n+1}{4}\right)^{th}$ term

$Q_2 = 2\left(\frac{n+1}{4}\right)^{th}$ term

$Q_3 = 3\left(\frac{n+1}{4}\right)^{th}$ term



CLASS WORK 1

Q_1, Q_2, Q_3

1. Compute all the quartiles for the following series of observations:

16, 14.9, 11.5, 11.8, 11.1, 14.5, 14, 12, 10.9, 10.7, 10.6, 10.5, 13.5, 13, 12.6.

Sol": Ascending order:

10.5, 10.6, 10.7, 10.9, 11.1, 11.5, 11.8, 12, 12.6,

13, 13.5, 14, 14.5, 14.9, 16

$n = 15$

$$Q_1 = \left(\frac{n+1}{4}\right)^{th} \text{term}$$

$$= \left(\frac{15+1}{4}\right)^{th} \text{term}$$

$$= 4^{th} \text{term} \quad (\text{Rank of } Q_1)$$

$$\boxed{Q_1 = 10.9}$$

$$Q_2 = 2\left(\frac{n+1}{4}\right)^{th} \text{term}$$

$$= (2 \times 4)^{th} \text{term}$$

$$= 8^{th} \text{term}$$

$$\boxed{Q_2 = 12}$$

$$Q_3 = 3\left(\frac{n+1}{4}\right)^{th} \text{term}$$

$$= (3 \times 4)^{th} \text{term}$$

$$= 12^{th} \text{term}$$

$$\boxed{Q_3 = 14}$$

Ans: $Q_1 = 10.9, Q_2 = 12, Q_3 = 14$

2. The heights (in cm) of 10 students are given below:

148, 171, 158, 151, 154, 159, 152, 163, 171, 145.

Calculate Q_1 and Q_3 for the above data.

Sol^n:

Ascending Order:

145, 148, 151, 152, 154, 158, 159, 163, 171, 171

$n = 10$

$$Q_1 = \left(\frac{n+1}{4}\right)^{th} \text{term}$$

$$= \left(\frac{10+1}{4}\right)^{th} \text{term}$$

$$= 2.75^{th} \text{ term}$$

$$= 2^{nd} \text{term} + 0.75(3^{rd} \text{term} - 2^{nd} \text{term})$$

$$= 148 + 0.75(151 - 148)$$

$$= 148 + 0.75 \times 3$$

$$= 148 + 2.25$$

$$\boxed{Q_1 = 150.25}$$

$$Q_3 = 3\left(\frac{n+1}{4}\right)^{th} \text{term}$$

$$= (3 \times 2.75)^{th} \text{term}$$

$$= 8.25^{th} \text{ term}$$

$$= 8^{th} \text{term} + 0.25(9^{th} \text{term} - 8^{th} \text{term})$$

$$= 163 + 0.25(171 - 163)$$

$$= 163 + 0.25 \times 8$$

$$= 163 + 2$$

$$\boxed{Q_3 = 165}$$

Ans: $Q_1 = 150.25$ cm

$Q_3 = 165$ cm

$$\begin{array}{r} 148.00 \\ 2.25 \\ \hline 150.25 \end{array}$$

3. **Monthly consumption of electricity (in units) of families in a certain locality is given below:**

205, 201, 190, 188, 194, 172, 210, 225, 215, 232, 260, 230.

Calculate electricity consumption (in units) below which 25% of the families lie.

H.W.

Sol^n: Electricity consumption (in units) below which 25% of the families lie = Q_1

(II) Discrete Data

Steps: (1) Ascending Order of 'x' column

(2) Find less than cumulative frequency (C.f.)

(3) Median $= \left(\frac{N+1}{2}\right)^{th}$ value of x

where $N = \Sigma f$ _ Σ = summation / total

$Q_1 = \left(\frac{N+1}{4}\right)^{th}$ value of x

$Q_3 = 3\left(\frac{N+1}{4}\right)^{th}$ value of x

4. For the following data of daily expenditure of families (in ₹), compute the expenditure below which 75% of families have their expenditure.

Daily Expenditure (in ₹)	350	450	550	650	750
No of families	16	19	24	28	13

Sol^n: Expenditure below which 75% of families have their expenditure i.e. Q_3

x	f	C.f.
350	16	16
450	19	35
550	24	59
650	28	87 (Q_3 class)
750	13	100
	$N =$	100

$$Q_3 = 3\left(\frac{N+1}{4}\right)^{th} \text{ value of } x$$

$$= 3\left(\frac{100+1}{4}\right)^{th} \text{ value of } x$$

$$= 75.75^{th} \text{ value of } x$$

$$Q_3 = 650$$

Ans: $Q_3 = ₹650$ //

75^{th} term $+ 0.75(76^{th}$ term $- 75^{th}$ term$)$

$650 + 0.75(650 - 650)$

650 //

5. Calculate all the quartiles for the following frequency distribution:

No. of E-trans-actions per day	0	1	2	3	4	5	6	7
No. of days	10	35	45	95	64	32	10	9

$Q_3 = 3\left(\frac{N+1}{4}\right)^{th}$ value of x

$= (3 \times 75.25)^{th}$ value of x

$= 225.75^{th}$ value of x

$Q_3 = 4$

501

75.25

4) 301

− 28

21

− 20

10

8

20

20

0

x	f	Cf	
0	10	10	
1	35	45	
2	45	90	Q_1
3	95	185	Q_2
4	64	249	Q_3
5	32	281	
6	10	291	
7	9	300	

$N = 300$

$Q_1 = \left(\frac{N+1}{4}\right)^{th}$ value of x

$= \left(\frac{300+1}{4}\right)^{th}$ value of x

$= 75.25^{th}$ value of x

$Q_1 = 2$

$Q_2 = 2\left(\frac{N+1}{4}\right)^{th}$ value of x

$= (2 \times 75.25)^{th}$ value of x

$= 150.5^{th}$ value of x

$Q_2 = 3$

Ex.3: Calculate the quartiles for the following data:

Height (in inches)	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7
No. of Stu-dents	5	7	13	16	25	14	9	6	3	2

$Q_2 = 2\left(\frac{N+1}{4}\right)^{th}$ value of x

$= 2 \times 25.25$

$= 50.5^{th}$ value of x

$\boxed{Q_2 = 5.2}$

$Q_3 = 3\left(\frac{N+1}{4}\right)^{th}$ value of x

$= 3 \times 25.25$

$= 75.75^{th}$ value of x

$\boxed{Q_3 = 5.3}$

x	f	cf	
4.8	5	5	
4.9	7	12	
5.0	13	25	Q_1
5.1	16	41	
5.2	25	66	Q_2
5.3	14	80	Q_3
5.4	9	89	
5.5	6	95	
5.6	3	98	
5.7	2	100	
	$N = 100$		

$Q_1 = \left(\frac{N+1}{4}\right)^{th}$ value of x

$= \left(\frac{100+1}{4}\right)^{th}$ value of x

$= 25.25^{th}$ value of x

$= 25^{th}$ value $+ 0.25(26^{th}$ value $- 25^{th}$ value$)$

$= 5 + 0.25(5.1 - 5)$

$= 5 + 0.25(0.1)$ $\quad 0.025$

$= 5 + 0.025$

$\boxed{Q_1 = 5.025}$

6. The following is the frequency distribution of heights of 200 male adults in a factory :

Heights (in cm)	No. of male adults
145 – 150	4
150 – 155	6
155 – 160	25
160 – 165	57
165 – 170	64
170 – 175	30
175 – 180	8
180 – 185	6

Find the central heights.

7. **The following is the data of pocket expenditure per week of 50 students in a class. It is known that the median of the distribution is ₹120. Find the missing frequencies.**

Expenditure per weeks (in ₹)	0 – 50	50 – 100	100 – 150	150 – 200	200 – 250
No. of students	7	?	15	?	3

8. The following in the distribution of 160 workers according to the wages in a certain factory:

Wages more than (in ₹)	No. of workers
8000	160
9000	155
10000	137
11000	103
12000	57
13000	23
14000	10
15000	1
16000	0

Determine the values of all quartiles and interpret the results.

9. Following is grouped data for duration of fixed deposits of 100 senior citizens from a certain bank :

Fixed deposits (in days)	0-180	180-360	360-540	540-720	720-900
No. of senior citizens	15	20	25	30	10

Calculate the limits of fixed deposits of central 50% senior citizens.

10. **Find the missing frequency given that the median of distribution is 1504 :**

Life (in hours)	950-1150	1150-1350	1350-1550	1550-1750	1750-1950	1950-2150
No. of bulbs	20	43	100	-	23	13