

## ① Percentiles and Quartiles [GATE, CAT]

Percentage : 1, 2, 3, 4, 5, 6

% of the numbers that are odd

$$\% \text{ of the odd} = \frac{3}{6} = \frac{1}{2} = 50\%$$

### Percentiles

Defn : A percentile is a value below which a certain percentage of observations or data points lie.

$$X = \{2, 3, 3, 4, \boxed{6}, 6, 6, 7, 8, 8, 9, 9, \boxed{10}, 11, 12\} \quad n=15$$

$\downarrow$  80 percentile  
 $\swarrow$  4+6 = 5  
 $\frac{5}{2}$

75 percentile : 75% of the entire distribution fall below the 75 percentile

Value

$$\boxed{X=10}$$

$$\text{Percentile Rank of 10} = \frac{\# \text{ of values below 10}}{n} \times 100$$

$$= \frac{12}{15} \times 100$$

$$= 80 \text{ percentile}$$

### Outcome

80% of the entire distribution falls below the value 10

② What value exists at percentile 25?

$$\text{Value} = \frac{\text{Percentile}}{100} * (n+1) \quad n=15$$

$$= \frac{25}{100} * 16$$

$$\begin{aligned} 4.5 &\Rightarrow 4.6 \\ &4.1 \Rightarrow 5 \\ &4.2 \end{aligned}$$

$$= 4 \Rightarrow \text{Index} \Rightarrow \underline{\underline{4^{\text{th}}}}$$

## ④ Quartiles

Q1 → 25 percentile

Q2 → Median

Q3 → 75 percentile

Eg:

E-commerce

	<u>Products</u>	<u>Delivery time</u>	<u>Location</u>
	—	2	—
	—	3	—
	—	1	—
	—	—	—

[Many Days]

↓

Task Assigned

↓

Analysis ⇒ 90% ⇒ 8 Products

## ② 5 Number Summary And Boxplot [To find outlier]

(i) Minimum

2) First Quartile (25 percentile)  $Q_1$

3) Median

4) Third Quartile (75 percentile)  $Q_3$

c) Maximum

### Removing the outlier

$X = \{1, 2, 2, 2, \boxed{3}, 3, 4, 5, 5, 5, 6, 6, 6, 6, \boxed{7}, 8, 8, 9, \boxed{29}\}$  → outlier

↓ 75 percentile ↓ outlier

↓ 25 percentile

[Lower Fence ← Higher Fence]

IQR = Inter Quartile Range

$$\text{Lower Fence} = Q_1 - 1.5(IQR)$$

$$\text{Higher Fence} = Q_3 + 1.5(IQR)$$

$$Q_1 = 25 \text{ percentile} = \frac{25}{100} \times (19+1) = \frac{25}{100} \times 20 = 5^{\text{th}} \text{ Value}$$

$$Q_1 = \underline{\underline{3}}$$
$$Q_3 = 75 \text{ percentile} = \frac{75}{100} \times (20) = 15^{\text{th}} \text{ Value}$$

$$Q_3 = \underline{\underline{7}}$$

$$IQR = Q_3 - Q_1 = 7 - 3 = \underline{\underline{4}}$$

$$\begin{aligned} \text{Lower Fence} &= Q_1 - 1.5(IQR) \\ &= 3 - 1.5(4) \\ &= 3 - 6 = \underline{\underline{-3}} \end{aligned}$$

$$\begin{aligned} \text{Higher Fence} &= Q_3 + 1.5(IQR) \\ &= 7 + 1.5(4) \\ &= 7 + 6 \\ &= \underline{\underline{13}} \end{aligned}$$

$$[-3, 13]$$

$$\text{Outlier} = \underline{\underline{29}}$$

$$X = \{1, 2, 2, 2, \boxed{3}, 3, 4, 5, 5, \boxed{5}, 6, 6, 6, 6, \boxed{7}, 8, 8, 9, \boxed{29}\} \rightarrow \text{outlier}$$

$\downarrow Q_1$                        $\downarrow Q_3$   
 $\downarrow$   
 Median

### 5 Number Summary

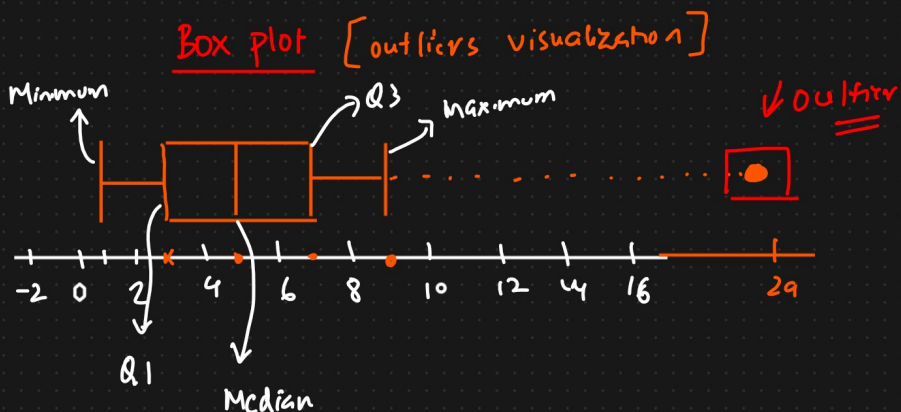
$$\text{Minimum} = 1$$

$$Q_1 = 3$$

$$\text{Median} = 5$$

$$Q_3 = 7$$

$$\text{Maximum} = 9$$



### Interval Assignment

$$Y = \{-13, -12, -5, -6, 3, 4, 5, 6, 7, 7, 8, 10, 10, 11, 55\}$$