

## Percentile

$$X = [x_1, x_2, \dots, x_n]$$

① Sort data.

$$x' = [x'_1, x'_2, \dots, x'_n]$$

$n=100$

$$50^{\text{th}} \text{ percentile} = x'_{50}$$

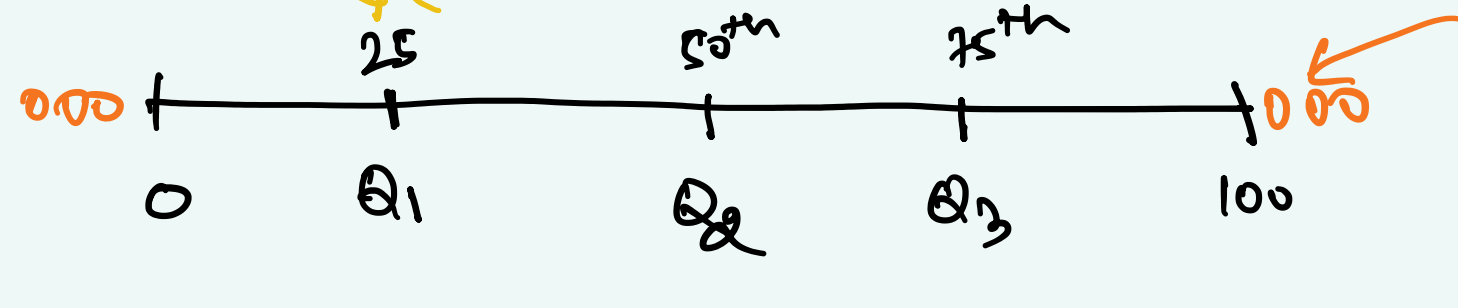
72

Delivery time: 0.5, 1, 1.25, 4, 7 days

95<sup>th</sup> percentile of delivery time  $\Rightarrow$  4.6 day  
 { 90<sup>th</sup> percentile  $\Rightarrow$  7 days }  
 8 days x

[Median = 50<sup>th</sup> Percentile]

## Quantile



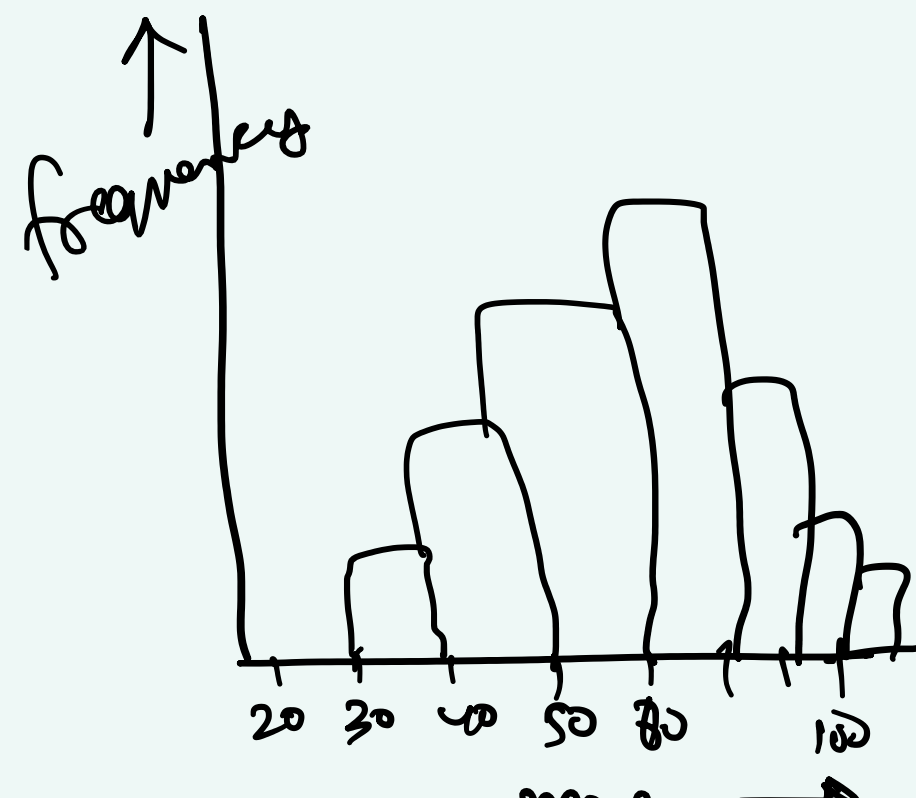
$$IQR \rightarrow \text{Inter Quartile Range} = Q_3 - Q_1$$

[75<sup>th</sup> - 25<sup>th</sup>]

## Histogram

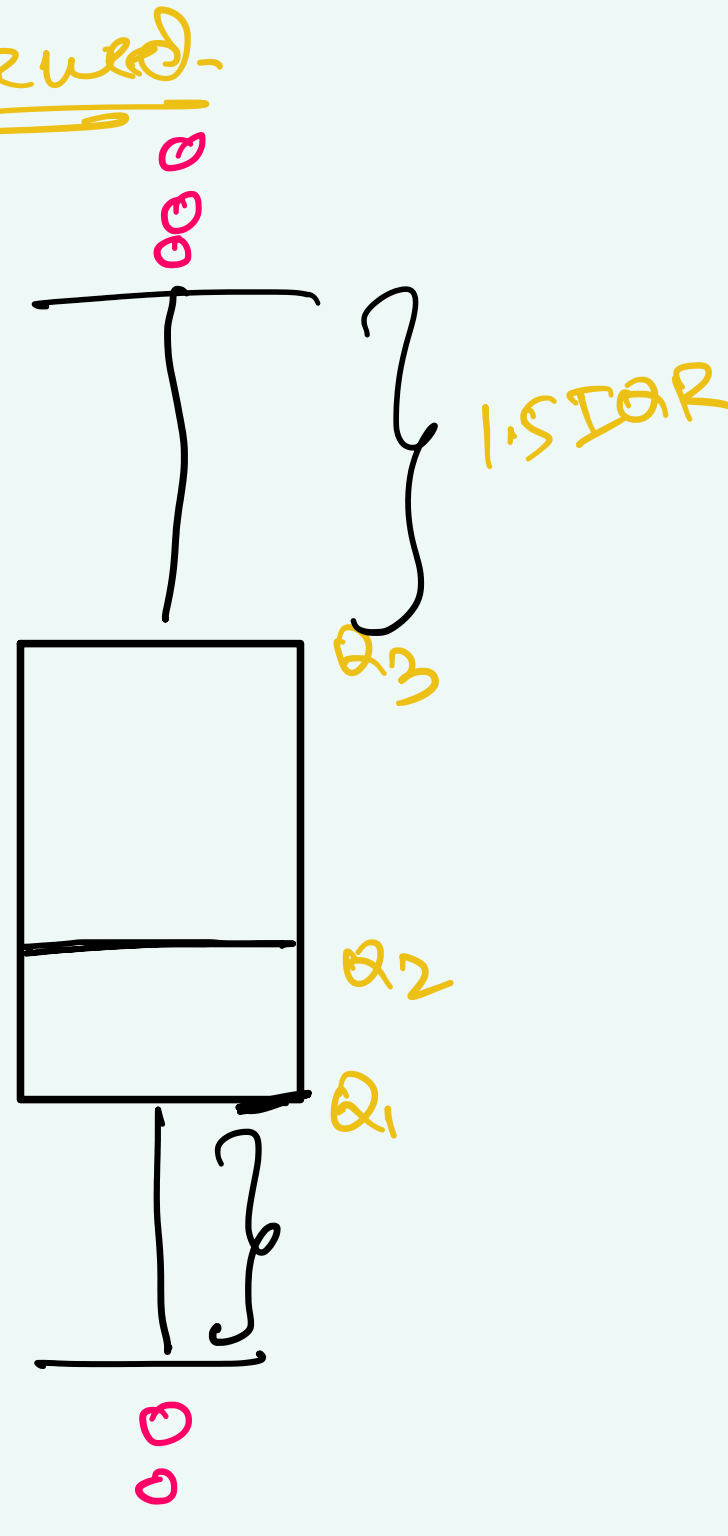
100 students

marks range	freq
30 - 40	2
40 - 50	7
50 - 60	15
60 - 70	25
70 - 80	32
80 - 90	17
90 - 100	11



## Skewed

data is skewed



## IQR Based Outlier Detection

$$X = [x_1, x_2, x_3, \dots, x_n]$$

$$Q_1 \quad Q_3 \quad IQR = Q_3 - Q_1$$

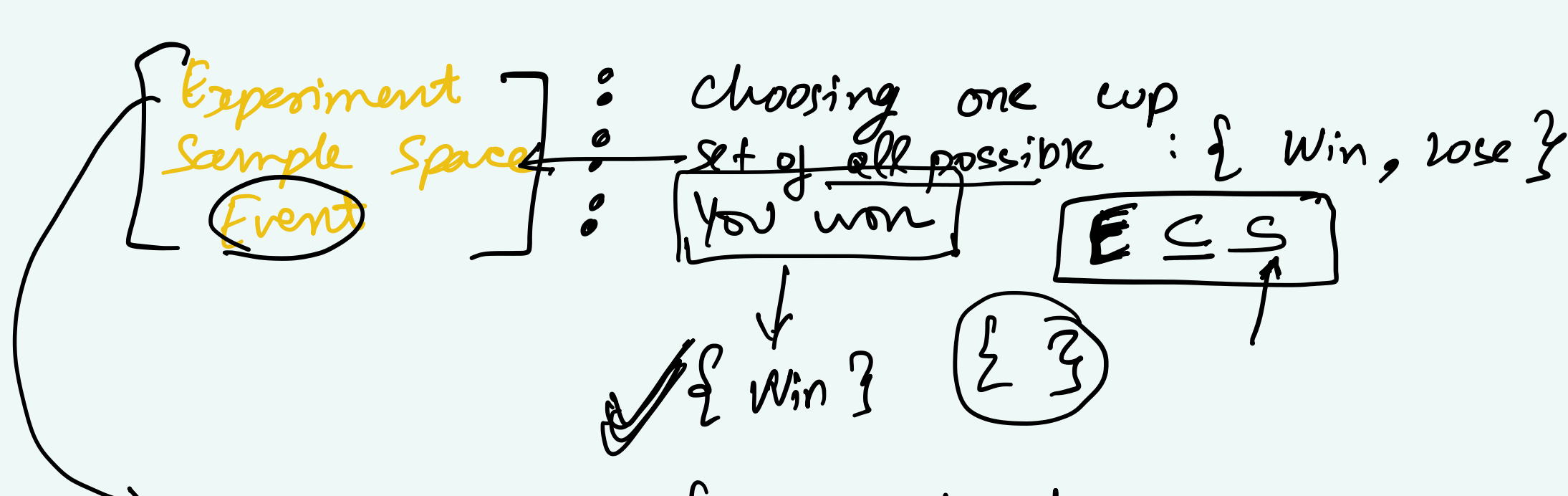
$$\text{Lower range} = Q_1 - 1.5 IQR \Rightarrow 7.2$$

$$\text{Upper range} = Q_3 + 1.5 IQR = 92.8$$

$$[7.2, 92.8]$$

## Probability

↳ uncertainty



Survey to ask for monthly salary.

$$\{x : 0 \leq x < \infty\}$$

Sample space: {10, 1M, 1B, 1797.5, ...}

Event: People earning more than \$5000. E

$$E \subseteq S$$

## How to Calculate Probability

$$P(E) = \frac{n(E)}{n(S)} = \frac{\text{no of desired outcome}}{\text{total possible outcome}}$$

$$\left(\frac{1}{6}\right) \quad E = \{5\} \quad \{1, 2, 3, 4, 5, 6\} \quad n(E) = 1 \quad n(S) = 6$$

E = getting odd number

$$E = \{1, 3, 5\}$$

$$n(E) = \frac{3}{6} \Rightarrow \frac{1}{2}$$

$$0 \leq P(E) \leq 1$$

$$P(S) = \frac{6}{6} = 1$$

$$P(S) = 1$$

$$\text{Coin} \rightarrow \frac{5 \text{ times}}{10 \text{ times}} \left(\frac{1}{2}\right) \left(\frac{1}{2^{10}}\right) \left(\frac{1}{2048}\right)$$

$$H \rightarrow 4$$

$$H \rightarrow 6$$

$$H \rightarrow 3$$

$$H \rightarrow 2$$

$$H \rightarrow 8$$

$$\frac{n(H)}{n(S)} = \frac{8}{10} = 0.8$$

$$\lim_{x \rightarrow \infty} \frac{n(E)}{n(S)}$$

$$0.5 \quad 50\%$$

## Marginal Probability

P(BSP winning next ele) = 0.1

$$P(\text{red card}) = \frac{26}{52} \Rightarrow \frac{1}{2}$$

## Conditional Probability



## Joint Probability P(A ∩ B)

Event A = Card is 5  $\rightarrow$  {5-spades, 5-hearts, 5}

Event B = Card is red  $\rightarrow$  {26 red cards}

$$P(A \cap B)$$

$$A \cap B = \{5\text{-hearts, 5-diamonds}\}$$

$$(S) = \frac{52}{52} \Rightarrow P(A \cap B) = \frac{2}{52} \Rightarrow \frac{1}{26}$$