STATISTICS

Percentile → Quartile

Percentage → $x\%\left\{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15\right\}$

mark 8 → $\%$ = $\frac{8}{15} \times 100$

$= 53\%$

Percentile → GMAT, GATE, CAT, SAT

(exam which have standard deviation percentage of data set)

So percentile is known as 75th of students who have met cutoff

$x = \{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20\}$

Find percentile of 8 in the dataset ?

percentile = $\frac{\text{no of values below 8}}{\text{total number}} \times 100$

$= \frac{7}{20} \times 100$

$= 35\%$ percentile

Q) 25th percentile

Step-1 → find index

index = $\frac{\text{percentile}}{100} \times (n+1)$

$= \frac{25}{100} \times (20)$

$= \frac{500}{100} = 5.5$

Value = avg of 5th & 6th index

$= \frac{(5+6)}{2} = 5.5$

Quartile → Distribution of data

Median

2Q1	2Q2	2Q3	2Q4
Q_1		Q_3	

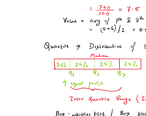
4 equal parts

Inter Quartile Range (IQR)

Box - whisker plot / Box plot

5 number summary

① Minimum value
② Q_1 (1st Quartile) → 25th
③ Q_2 (Median)
④ Q_3 (3rd Quartile) → 75th
⑤ Maximum value



$Q_3 - 1.5 \times IQR$

upper fence → $Q_3 + 1.5 \times IQR$

Q) ① Sort the data
② Q_1, Q_3
③ $IQR = Q_3 - Q_1$
④ Lower bound & upper bound
⑤ Value < lower bound & value > upper bound

lower → $Q_1 - 1.5 \times IQR$

upper → $Q_3 + 1.5 \times IQR$

$IQR = Q_3 - Q_1$

Formula

Median → IQR

Exclusive (exclude median) | Inclusive (include median)

① ODD data points
② Even data points

Step-1: Sort data

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

Step-2: Find median & Separate Values

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

1st half | 2nd half

median

median = $\frac{72+76}{2}$ = 74 even no.

Step-3: Find Q_1 & Q_3

median (Q2)

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

1st | 2nd

Step-4: $IQR = Q_3 - Q_1 = 81 - 57 = 24$

Odd no / Exclusive

Step-1 Sort

Step-2 → Find median & Separate Dataset

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

1st half | median | 2nd half

Step-3: Q_1 & Q_3

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

Q_1 Q_3 max

Step-4 $Q_3 - Q_1 = IQR = 81 - 57 = 24$

Inclusive method →

Step-1 Sort

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

Step-2: Find median & Separate Dataset

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

1st half | 2nd half

Step-3: Q_1 & Q_3

48, 52, 57, 64, 72, 76, 77, 81, 85, 88

$= \frac{57+64}{2} = 59$ (Q_1)

$= 77$ (Q_3)

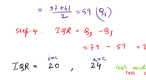
Step-4: $IQR = Q_3 - Q_1$

$= 77 - 59 = 20$

$IQR = 20$ (exc), 24 (inc)

less width less dispersion

Inclusive



Exclusive

more dispersion more width

exc Inc

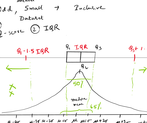
Smaller IQR

Q) where to use which method

Even & Large Dataset → Exclusive

Odd, Small Dataset → Inclusive

① 2-sets ② IQR



IQR
① Spread/ Dispersion
② Outliers
③ Skewness → asymmetry

① left ② Right