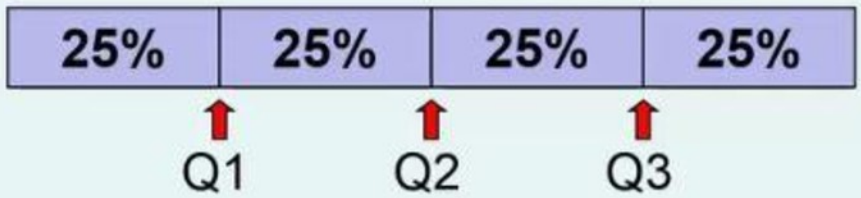
Quartiles

Inter Quartile

Quartile Measures

- Quartiles split the ranked data into 4 segments with an equal number of values per segment



- The first quartile, Q_1, is the value for which 25% of the observations are smaller and 75% are larger
- Q_2 is the same as the **median**—*the middle number* (50% of the observations are smaller and 50% are larger)
- Only 25% of the observations are greater than the third quartile

Example

Sample Data in Ordered Array: 11 12 13 16 16 17 18 21 22

- Find Q1, Q2, Q3?
- n = 9

$$Q_1 = (n+1)/4$$

$$Q_2 = (n+1)/2$$

$$Q_3 = 3(n+1)/4$$

Quartile Measures: Locating Quartiles

Sample Data in Ordered Array: 11 12 13 16 16 17 18 21 22

$Q_1 = (n+1)/4$

(n = 9)

Q_1 is in the (9+1)/4 = 2.5 position of the ranked data

so use the value half way between the 2nd and 3rd values,

so $Q_1 = 12.5$

Q_1 and Q_3 are measures of non-central location
Q_2 = median, is a measure of central tendency

Quartile Measures
Calculating The Quartiles: Example

Sample Data in Ordered Array: 11 12 13 16 16 17 18 21 22

(n = 9)

Q_1 is in the (9+1)/4 = 2.5 position of the ranked data,

so **Q_1 = (12+13)/2 = 12.5**

Q_2 is in the (9+1)/2 = 5th position of the ranked data,

so **Q_2 = median = 16**

Q_3 is in the 3(9+1)/4 = 7.5 position of the ranked data,

so **Q_3 = (18+21)/2 = 19.5**

$Q_1 = (n+1)/4$

$Q_2 = (n+1)/2$

$Q_3 = 3(n+1)/4$

Q_1 and Q_3 are measures of non-central location
Q_2 = median, is a measure of central tendency

Quartile Measures: The Interquartile Range (IQR)

- **$IQR = Q_3 - Q_1$**
- The IQR is also called the mid-spread because it covers the middle 50% of the data

Example: The Interquartile Range (IQR)

Sample Data in Ordered Array: 11 12 13 16 16 17 18 21 22

IQR = Q3 – Q1 = 19.5 – 12.5 = **7**

Q_1 is in the (9+1)/4 = 2.5 position of the ranked data,

so **Q_1 = (12+13)/2 = 12.5**

Q_2 is in the (9+1)/2 = 5^{th} position of the ranked data,

so **Q_2 = median = 16**

Q_3 is in the 3(9+1)/4 = 7.5 position of the ranked data,

so **Q_3 = (18+21)/2 = 19.5**