

Five number summary (FNS) is a set of descriptive measures that consist of :-

- 1] minimum (min) smallest observation
- 2] lower quartile (Q_1)
- 3] median (Q_2)
- 4] upper quartile (Q_3)
- 5] maximum (max)

FNS helps:

- 1] describe the spread or variation (distribution shape)
- 2] determine outliers

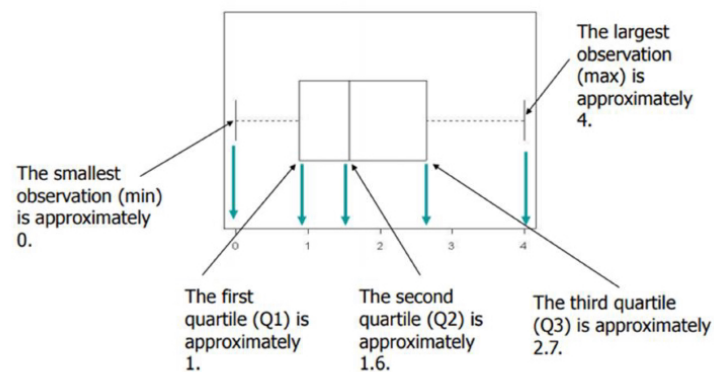
Box plot = Box and whisker plot

Box plot helps to:-

- 1] compare between several groups of data sets
- 2] identify outliers
- 3] identify approximate shape of distribution

- Dots outside the box plot $\rightarrow$ outliers
- maximum and minimum are at the ends of each whisker
- the upper and lower quartiles are at the end of the box

Example Boxplot



Outliers occur because:

- 1] of an error during data entry
- 2] an error in measurement
- 3] an error in sampling

(خطأ في ادخال البيانات)
(خطأ في القياس)
(خطأ في العينة)

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

$$\text{Upper fence} = Q_3 + 1.5 (IQR)$$

- If $Q_2 - Q_1 = Q_3 - Q_2$ then the shape is bell-shaped
- If $Q_2 - Q_1 > Q_3 - Q_2$ then shape is left skewed (-)
- If $Q_2 - Q_1 < Q_3 - Q_2$ then shape is Right skewed (+)