② Variation Measures (Not for nominal)

* Standerd deviation (Sd) الإنحراف المعياري $= \sqrt{\text{Variance}} = \sqrt{\frac{\Sigma (X-M)^2}{n-1}}$

- Affected by outliers
- symmetrical distribution (one mode)
- Distance of values from Mean

* Range $= Max - Min$ المدى

- Affected by outliers
- Affected by sample size
- Asymmetrical dist.

* $IQR = P_{75} - P_{25}$

- Middle 50 of data
- similar to median (P_{50}) (used when Median Repeated)

* Percentile = Value Certain percenage above it & below it النسب المئوية

- Asymmetrical dist.

ex: $P_{60} = 30$ (60 of values below the value 30) (40 above 30)

important

P_{25} → first quartile

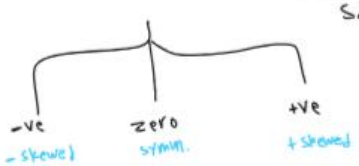
P_{50} → second quartile (Median)

P_{75} → Third quartile

* Measures of symmetry

- To Determie degree of symmetry

① Pearson's Coefficient $= \frac{\text{Mean} - \text{Median}}{Sd}$



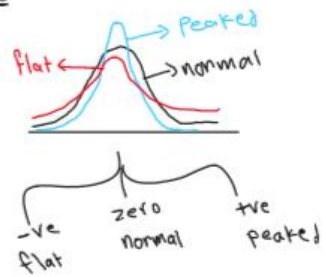
note 1 : $Pc > 0.2$ → sever skewed (+)

$Pc < -0.2$ → sever skewed (-)

② Fisher's Coefficient $= \frac{(\text{Mean} - \text{Median})^3}{Sd}$

note 1 : > 1.96 Sd / < -1.96 Sd → severe skewed

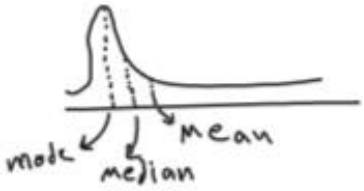
* kurtosis



± Graph (Distribution)

① Symmetrical

② Skewed to Right (⊕ skewed)



- Mean > median > mode
- Pile up (left)
- Tail (Right)

③ Skewed to left (⊖ skewed)

- Mean < Median < mode
- Pile up (Right)
- Tail (left)

note 1 : skewed dist.
Mean not the center value

BioStat #4

*Stat
- Descriptive
- Infrential
  - hypothesis Test

*Parameters vs Statistics

Parameters	Statistics
Pop	Sample
μ	$\bar{X}$
σ^2	s^2
σ	s

*Parameters
- Central Tendency measurments
  - Mean
  - Median
  - Mode
- Variation measurments
  - Standerd deviation
  - Range
  - percentile

① Central Tendency Measurments

*Mean (avg) = $\frac{\sum x}{n}$

- one value
- Interval + Ratio + ordinal
- symmitrical distribution
- Affected by outliers

note 1: Sum of deviations from Mean for each value = zero

note 2: We can't calculate Mean of the Means

*Median = Middle value

- one value
- Interval + Ratio + ordinal
- symmetrical & asymmetrical distribution
- Not Affected by outliers

note 1: Best Measure in case of Asymmetrical distribution

note 2: 50^{th} Percentile

*Mode = most frequent value

- one value or 2 or >2 or No
- All type of data (Nominal)
- Affected by outliers

note 1: Not calculated but spotted