In [ ]:
```
# Measure of dispersion

- Nee to quantify, how spread out  or scattered the data points in the dataset a

- it describes the extent to which values in a dataset differ from each other or
```

In [ ]:
```
# Types of Measure of dispersion

1- Range

2- IQR

3- Variance

4- statand deviation
```

Range

In [ ]:
```
# definition --
the difference between the maximum and minimum value in dataset

Range = Maximum value - Minimum value
```

In [2]:
```
import numpy as np
import statistics as s
```

In [1]:
```
lst = [4,8,15,16,23]
value = max(lst) - min(lst)
value
```

Out[1]: 19

IQR

In [ ]:
```
IQR = Q3 - Q1

Definition  : The Range of middle 50% of the data , calculated the differnce bet
```

In [3]:
```
lst  = [4,8,15,16,23,1,7]

lst = sorted(lst)
lst
```

Out[3]: [1, 4, 7, 8, 15, 16, 23]

In [ ]:
```
Q1 = 1 /4 (n+1)nth terms --- lower bound

Q3 =  3 /4 (n+1)nth terms  ---upper bound

IQR = Q3- Q1
```

In [12]:
```
Q1 = 1 / 4 *(7+1)
Q1 # --- it is returning the index value of 2
```
Out[12]: 2.0

In [10]:
```
Q3 = 3/4 * (7 + 1)
Q3  # --- it is returning the index value of 6
```
Out[10]: 6.0

In [14]:
```
Q1  = 7
Q3 =  23

IQR = Q3 -  Q1
IQR
```
Out[14]: 16

In [16]:
```
lst  = [4,8,15,16,23,1,7]

sum(lst)/7
```
Out[16]: 10.571428571428571

In [ ]:
```
# Variance

the average of the squared differnece between each data point and the mean.

lst  = [4,8,15,16,23,1,7]
Mean value  = 10

(4 -10)2 = (-6)2 ===> 36 + 4 + 22 + 22+ 29 +2+3 / 7

Population  -- whole

Population Variance (σ²): Σ(xᵢ - μ)² / N

where xi is each data point , mu --> is the mean N is the total no of data point


Sample --  sample

Sample Variance (s²): Σ(xᵢ - x̄)² / (n - 1)
where xi is each data point , mu --> is the mean n is the no of sample size
```

In [17]:
```
lst  = [4,8,15,16,23,1,7]

s.variance(lst)
```
Out[17]: 59.61904761904762

Standard deviation --> squraed root of variance is called standard deviation

$$Standard\ Deviation = \sqrt{Variance} = \sqrt{\sigma^2} = \sqrt{\frac{\Sigma(x_i - \mu)^2}{n}}$$

$$i = 1, 2, 3, 4, ...$$

$$\mu : population\ mean$$

$$n = number\ of\ datapoints$$

In [ ]:

In [24]:
```
lst
```

Out[24]: `[4, 8, 15, 16, 23, 1, 7]`

In [23]:
```
s.stdev(lst)
```

Out[23]: `7.7213371652225895`

In [ ]: