Measure of central tendency and its types

- Geometric mean (G.M)
- Harmonic mean (H.M)

Measure of central tendency and its types:

- Geometric and Harmonic mean for ungroup and group data. Its uses and applications

Geometric Mean

- The geometric mean is useful in finding the average change of percentages, ratios,indexes, or growth rates over time. It has a wide application in business and economics because we are often interested in finding the percentage changes in sales, salaries, or economic figures, such as the Gross Domestic Product, which compound or build on each other.

Defination

- The geometric mean of a set of n positive numbers is defined as the nth root of the product of n values. The formula for the geometric mean is written:
- For ungroup
- Further study See book Chapter 3 page 77

$$G.M = \sqrt[n]{x_1.x_2.x_3....x_n}$$

$$G.M = anti\log[\frac{1}{n}\{\sum \log x_i\}]$$

- For group

$$G.M = anti\log[\frac{1}{\sum f}\{\sum f \log x_i\}]$$

For Ungroup data

Percentage rise in population	Population at the end of year x_i	$\log x_i$
15	115	2.0607
25	125	2.0969
5	95	1.9777
		6.1353

$$G.M = \text{Antilog} \frac{\sum_{n}^{n} \log x_i}{n}$$

$$= \text{Antilog} \frac{(6.1353)}{3}$$

$$= \text{Antilog}\,(2.0451)$$

$$= 110.9$$

Harmonic Mean

$$H.M = \frac{}{\frac{1}{x}}$$

- Harmonic mean is the reciprocal of arithmetic mean and reciprocal of its values.
- Formula
- for ungroup

$$H.M = \frac{n}{\sum \frac{1}{x}}$$

- for group

$$H.M = \frac{\sum f}{\sum (\frac{f}{x})}$$

Example for Ungroup data

Truck Number	1	2	3	4
Km. driven	40	50	60	75

x	$1/x$
40	0.02500
50	0.02000
60	0.01677
75	0.01333
	0.07500

$$H.M = \frac{N}{\sum 1/x}$$

$$H.M = \frac{4}{0.07500}$$

$$H.M = 53.33\ Km.$$

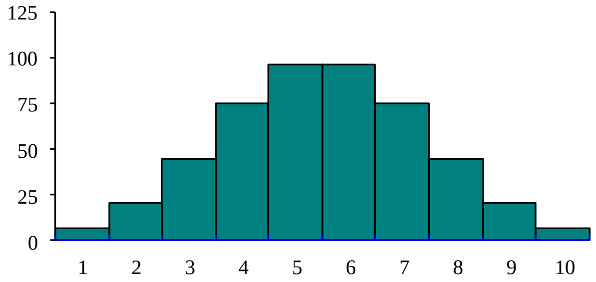
Measures of Dispersion

Definition

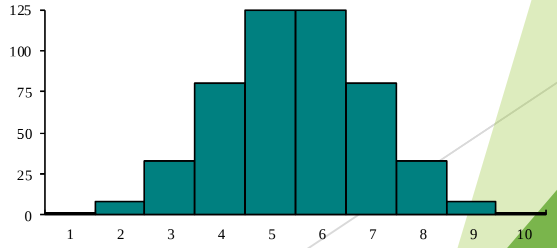
- *Measures of dispersion* are descriptive statistics that describe how similar a set of scores are to each other
  - The more similar the scores are to each other, the lower the measure of dispersion will be
  - The less similar the scores are to each other, the higher the measure of dispersion will be
  - In general, the more spread out a distribution is, the larger the measure of dispersion will be

Measures of Dispersion

- Which of the distributions of scores has the larger dispersion?



- The upper distribution has more dispersion because the scores are more spread out
  - That is, they are less similar to each other



Types of dispersion

- Absloute Measure of dispersion
- Relative measure of dispersion

Absloute Measure of dispersion

- Range
- The semi-interquartile range (SIR) or Quartile Deviation(Q.D)
- Mean Deviation (M.D)
- Standard deviation

Relative measure of dispersion

- Co-efficient of Range
- Co-efficient of Quartile Deviation(Q.D)
- Co-efficient of Mean Deviation (M.D)
- Co-efficient of Standard deviation
- Variance

Mean deviation

The mean of the absolute values of the numerical differences between the numbers of a set (such as statistical data) and their mean or median or mode.

Mean deviation

The mean deviation is 16 cappuccinos. That is, the number of cappuccinos sold deviates, on average, by 16 from the mean of 50 cappuccinos.

The following shows the detail of determining the mean deviation for the number of cappuccinos sold at the Ontario Airport.

	A	B	C
1	Calculation of Mean Deviation Ontario		
2	Number Sold	Each Value – Mean	Absolute Deviation
3	20	20 – 50 = -30	30
4	49	49 – 50 = -1	1
5	50	50 – 50 = 0	0
6	51	51 – 50 = 1	1
7	80	80 – 50 = 30	30
8			
9		Total	62

$$MD = \frac{\Sigma|X - \bar{X}|}{n} = \frac{30 + 1 + 0 + 1 + 30}{5} = \frac{62}{5} = 12.4$$