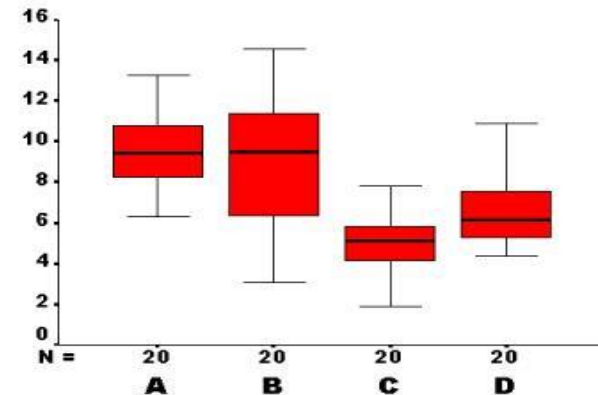
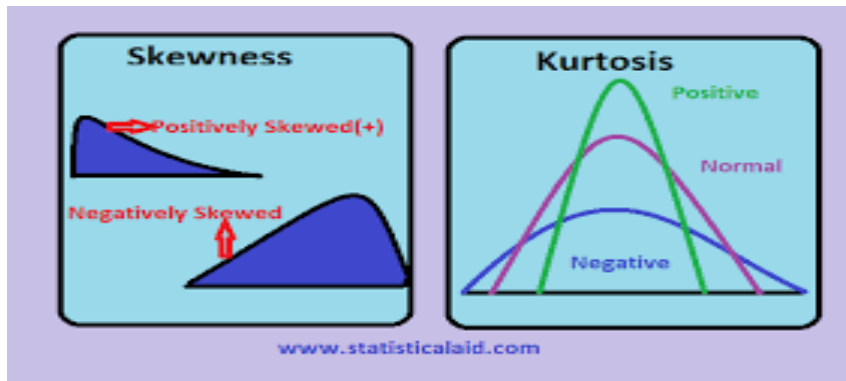


# Box Plot, Skewness, Kurtosis



Ansar Shahzadi  
School of Electrical Engineering & Computer Science  
National University of Science and Technology(NUST)

# Box Plot

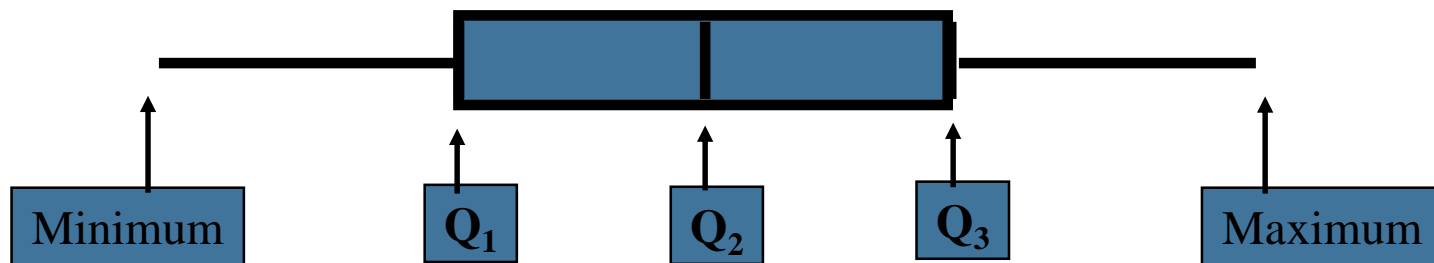
We use a box plot to graphically summarize a data set.

To construct a box plot, first obtain a 5 number summary

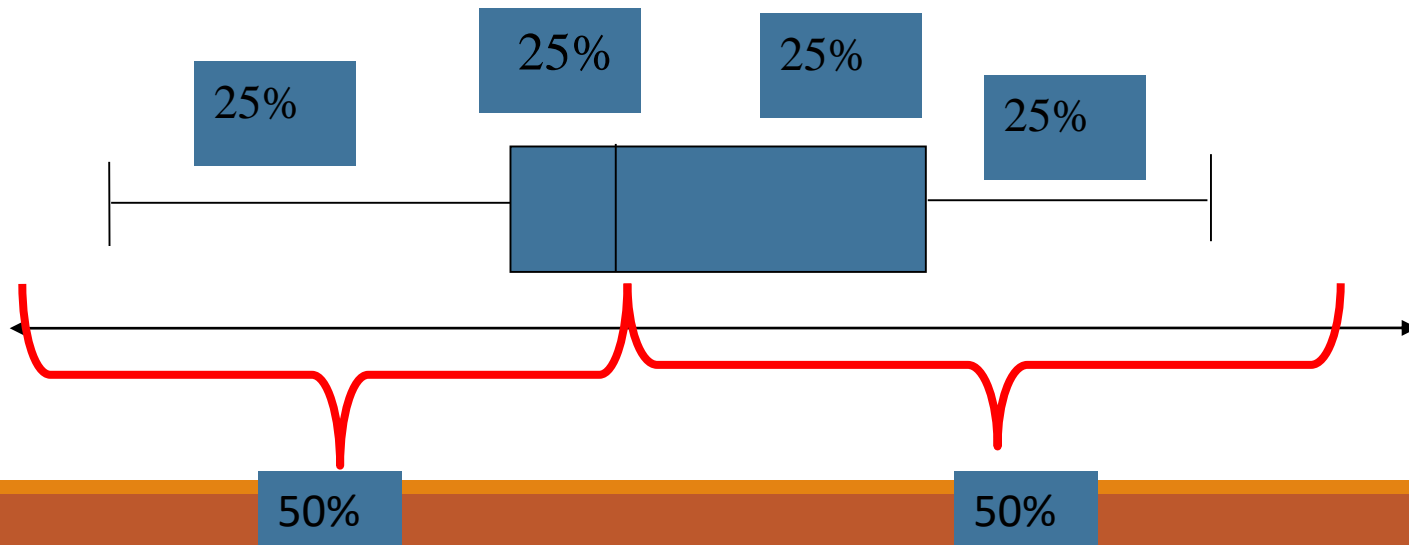
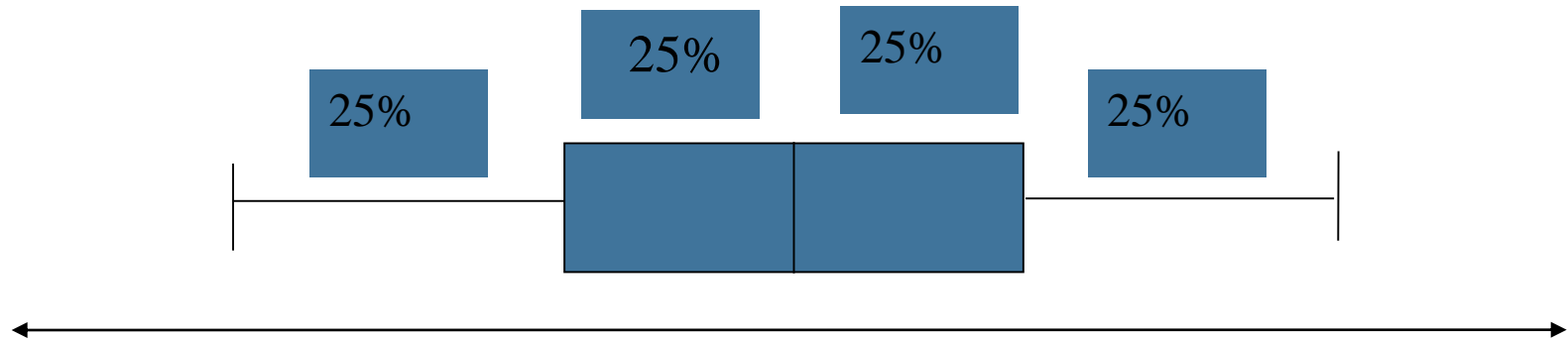
Minimum value

Lower quartile

Median



# Box Plot

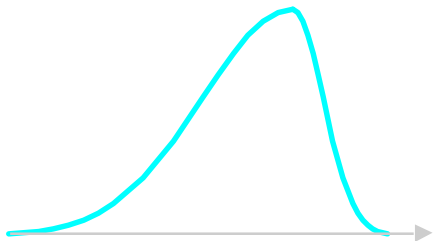


# Skewness

---

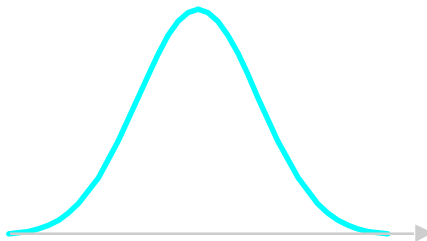
Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point.

Negatively-Skewed



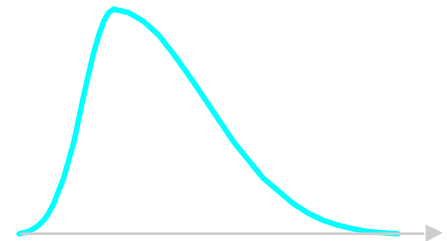
**Mode>Median>Mean**

Symmetric



**Mean=Median=Mode**

Positively-Skewed



**Mean>Median>Mode**

# Measures of Skewness

---

$$b_1 = \frac{(m_3)^2}{(m_2)^3}$$

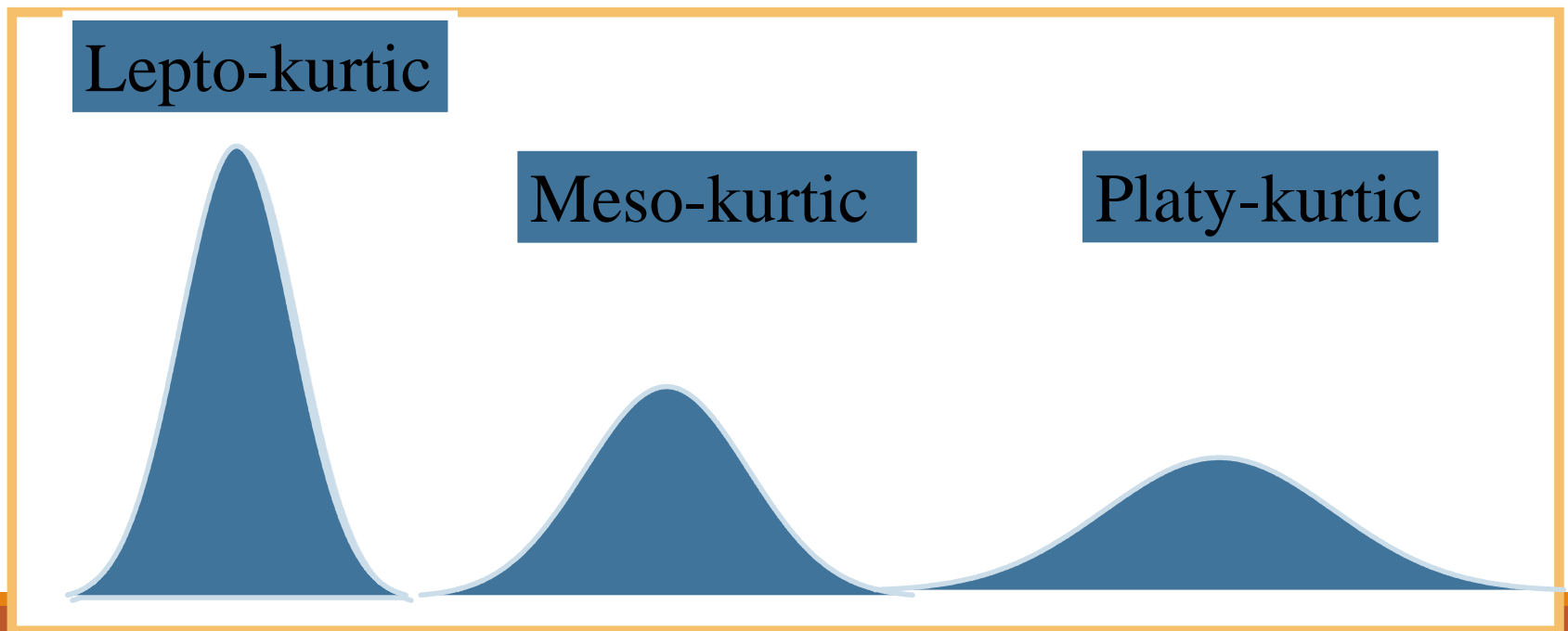
Where  $m_2 = \frac{\sum(x_i - \bar{x})^2}{n}$  and  $m_3 = \frac{\sum(x_i - \bar{x})^3}{n}$

- $\sqrt{b_1} = 0$  the distribution is symmetrical
- $\sqrt{b_1} < 0$  the distribution is Negatively Skewed
- $\sqrt{b_1} > 0$  the distribution is Positively Skewed

# Kurtosis

---

Kurtosis characterizes the relative peakedness or flatness of a distribution compared to the normal distribution



# Measures of Kurtosis

---

$$b_2 = \frac{m_4}{(m_2)^2}$$

Where  $m_2 = \frac{\sum (x_i - \bar{x})^2}{n}$  and  $m_4 = \frac{\sum (x_i - \bar{x})^4}{n}$

- $b_2 = 3$  the distribution is meso-kurtic or normal
- $b_2 < 3$  the distribution is platy-Kurtic
- $b_2 > 3$  the distribution is Lepto-kurtic