Chapter 3: central tendency measures

1) What is central tendency

   It describes the average cases

2) What are the measures of central tendency

   Mode, median, and mean

3) Mode: the group of a variable with the highest frequency

4) Median: the central point that splits the sample into two equal halves

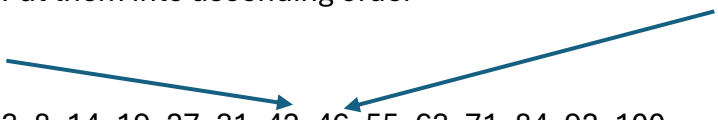
When N is odd number, Median locates at the $(\frac{N+1}{2})^{th}$ position

When N is even number, median is the average of two values located at $(\frac{N}{2})^{th}$ and $(\frac{N}{2}+1)^{th}$

Examples

42, 8, 71, 19, 100, 3, 55, 27, 92, 14, 63, 31, 84, 46

Put them into ascending order



3, 8, 14, 19, 27, 31, 42, 46, 55, 63, 71, 84, 92, 100

14/2 = 7th, and 8th

(42 + 46)/2 = 44

Median = 44

57, 12, 84, 29, 6, 91, 43, 18, 67

Median = 43

6, 12, 18, 29, 43, 57, 67, 84, 91

(9+1)/2 = 5th

Median = 43

5) Compute the mean

$$\bar{X} = \frac{\sum X_i}{N}$$

a) 57, 12, 84, 29, 6, 91, 43, 18, 67

$$\bar{X} = \frac{57 + 12 + 84 + 29 + 6 + 91 + 43 + 18 + 67}{9} = 45.2$$

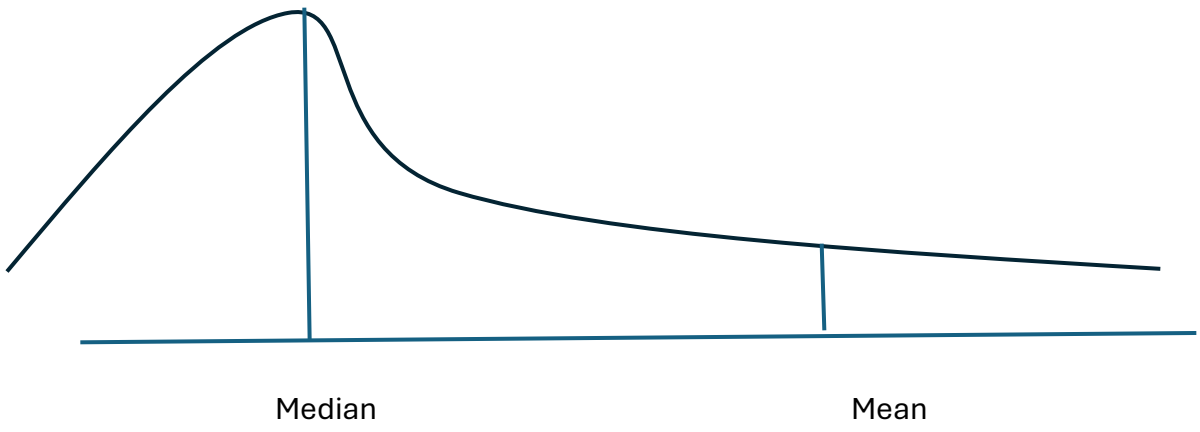
B) 3, 8, 14, 19, 27, 31, 42, 46, 55, 63, 71, 84, 92, 100

$$\bar{X} = 46.8$$

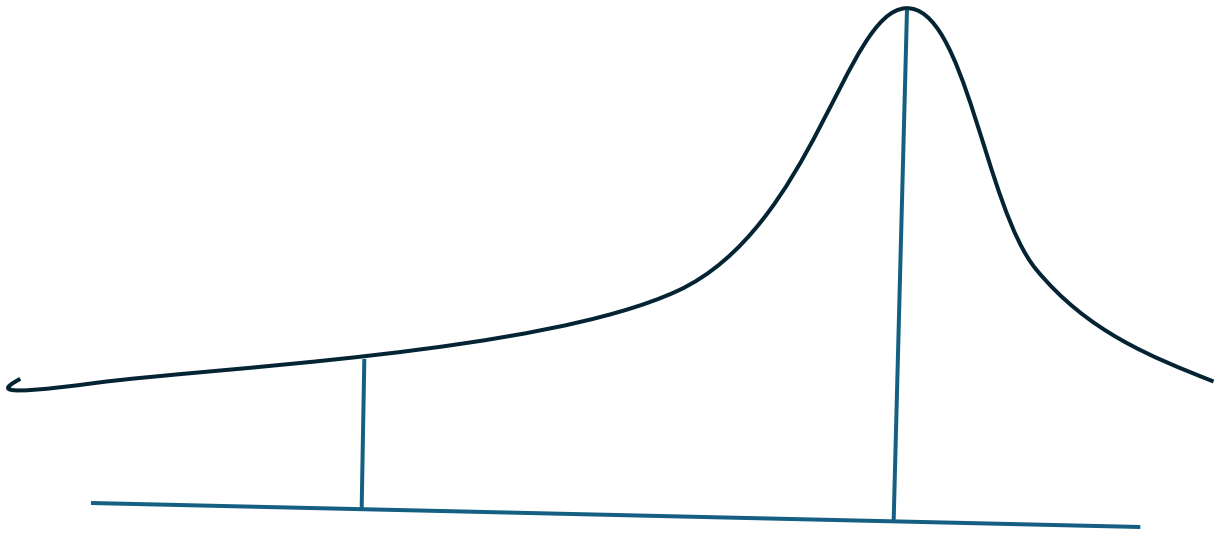
6) Features of the central tendency measures

Mean is not immune to the outliers, while median is more robust in facing outliers

Cases	Sample A	Sample B
1	$24k	$24k
2	$38K	$38K
3	$45K	$45K
4	$60K	$60K
5	$87K	$10,000K
Median	$45K	$45K
Mean	$50.8K	$2,033.4K



Mean > Median (Sample B), this is called Right-Skewed



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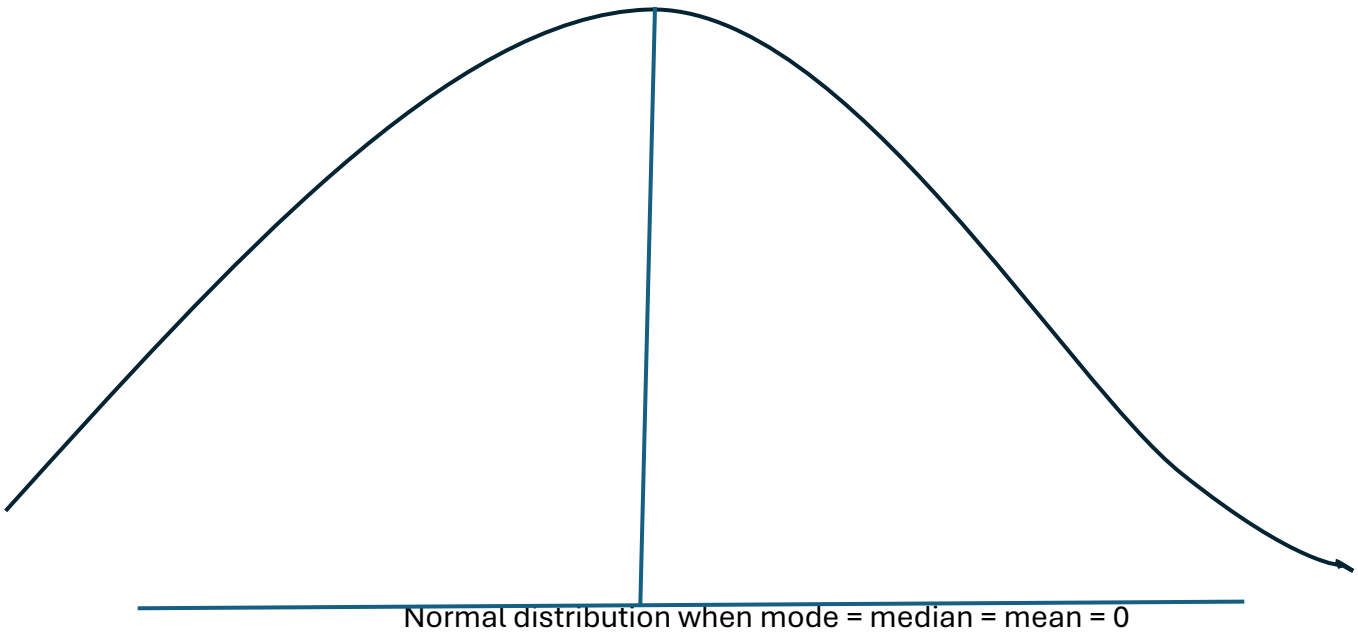

Normal distribution when mode = median = mean = 0