Exercise 02 – September 23-25, 2025

1. Calculate the Trimean for a dataset below

   Data set:
   10, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 50

   Solution:

   Step 1: Sort the Data
   The data is already sorted in ascending order:
   10, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 50

   Step 2: Find the Median
   Since there are 15 values (an odd number), the median is the 8th value in the sorted list:
   Median = 30

   Step 3: Find Q1 and Q3
   Q1 (1st Quartile): This is the median of the lower half of the data (excluding the median itself):
   Lower half = 10, 12, 15, 18, 21, 24, 27
   The median of this lower half (7 values) is the 4th value:
   Q1 = 18

   Q3 (3rd Quartile): This is the median of the upper half of the data (excluding the median itself):
   Upper half = 33, 36, 39, 42, 45, 48, 50
   The median of this upper half (7 values) is the 4th value:
   Q3 = 42

   Step 4: Calculate the Trimean
   The formula for the trimean is:

$$\text{Trimean} = \frac{Q1 + 2 \times \text{Median} + Q3}{4}$$

   Substitute the values:

$$\text{Trimean} = \frac{18 + 2 \times 30 + 42}{4} = \frac{18 + 60 + 42}{4} = \frac{120}{4} = 30$$

   Conclusion
   The trimean of this dataset is 30. This measure incorporates the median (with twice the weight) and the quartiles, providing a balanced estimate of central tendency that is robust to outliers.

2. Geometric Mean
   Suppose the population of a city changes over four years with the following annual growth rates:
   Year 1: +5%
   Year 2: +10%

Year 3: −3%
Year 4: +6%

Calculate the geometric mean of the growth rates to find the average population growth rate over these 4 years

Solution:

Step 1: Convert percentages to growth factors
Convert each percentage into a decimal growth factor by adding 1:

Year 1: 1 + 0.05 = 1.05
Year 2: 1 + 0.10 = 1.10
Year 3: 1 − 0.03 = 0.97
Year 4: 1 + 0.06 = 1.06

Step 2: Calculate the product of the growth factors

1.05 × 1.10 × 0.97 × 1.06 = 1.181841

Step 3: Calculate the geometric mean
Since there are 4 years, the geometric mean is the 4th root of the product:

$$GM = \sqrt[4]{1.181841} \approx 1.0426$$

Step 4: Convert back to percentage
To express this as a percentage growth rate, subtract 1 and multiply by 100:

1.0426 – 1 = 0.0426 or 4.26%

Conclusion:
The average annual population growth rate over these 4 years is approximately 4.26% per year, even though the individual rates varied each year. The geometric mean smooths out the effect of the fluctuations and gives a meaningful long-term average growth rate.

3. Trimmed Mean
Consider the following dataset of 10 values representing exam scores:

65, 70, 72, 75, 80, 85, 90, 92, 95, 100

Calculate the 10% trimmed mean

Solution:

Step 1: Sort the data (if not already sorted)
In this case, the data is already sorted in ascending order:

65, 70, 72, 75, 80, 85, 90, 92, 95, 100

Step 2: Trim 10% from both ends
Since we have 10 values, trimming 10% means removing 10% of the values from each end.

10% of 10 = 1 value from the top and 1 value from the bottom.
So, remove the smallest value (65) and the largest value (100).

Step 3: Calculate the mean of the remaining values
The remaining values are:

70, 72, 75, 80, 85, 90, 92, 95

Now, calculate the mean of these 8 values:

Sum = 70 + 72 + 75 + 80 + 85 + 90 + 92 + 95 = 659

$$\text{Mean} = \frac{659}{8} = 82.375$$

Conclusion:
The 10% trimmed mean of the dataset is 82.375.
By trimming the lowest and highest values (65 and 100), we remove the possible influence of any outliers, providing a more robust average value.