Ans 1. Considering a dataset if we want to calculate the center or typical value, we need the measures of central tendency. The measures are mean, median, and mode.

Mean: Mean is the sum of all the values in the dataset divided by the number of values in the dataset. It is highly sensitive to outliers (extremely high or low values)

Median: Median is middle of value of a sequence ordered (increasing or decreasing order) dataset. But unlike mean it is not influenced by extremely high or low values.

Mode: A dataset can have one mode (Unimodal), more than one mode (bimodal/multimodal). Modes can be used for categorical data where outliers are not important.

Ans 2. Standard deviation measures the extent of variation in a dataset. It helps us to determine how much the values are deviated from its mean (average) in a dataset. When standard deviation is low, the values in the dataset are more close to mean which indicate that the dataset are more consistent (less variability) and vice versa for dataset with high standard deviation.

Ans 3. Box plot represents the distributions of a dataset graphically. Interquartile range (IQR) of box plot has the middle 50 percent of the data. The lower edge of the box (first quartile (Q1)), upper edge of the box (third quartile (Q3)) and line inside the box indicate 25th, 75th and 50th percentile respectively. If we want to get visual summary of central tendency, skewness, variability, and potential outliers of a dataset, we can take the help of box plot.

Ans 4. The interquartile range (IQR) is a measure of statistical dispersion that represents the range containing the central 50% of data points. It is calculated as the difference between the third quartile (Q3) and the first quartile (Q1). It helps to measure the spread, data distribution in a dataset. It can also compared the two dataset. Outliers are data points that fall significantly outside the expected range of values. We can calculate IQR=Q3−Q1. Next we can determine the boundaries by the formulas Lower Bound=Q1−1.5×IQR and Upper Bound=Q3+1.5×IQR. Then, Any data point below the lower bound or above the upper bound can be classified as an outlier.

Ans 5. Maximum Likelihood Estimators (MLE) is used to estimate the parameters of a statistical model. The key idea is to find the parameter values that maximize the likelihood function, thereby making the observed data most probable given these parameters. In practice, MLE involves selecting a model and computing the likelihood of the observed data for various parameter estimates. The parameter values that result in the highest likelihood are considered the best estimates. This typically requires setting up the likelihood function based on the data's probability distribution, taking its derivative with respect to the parameters, and solving for the values that set the derivative to zero, thus locating the maximum. MLE is widely used because of its desirable properties, such as consistency and efficiency, under regular conditions.