NOTES:

14: Averages of Statistical Data

Measures of Central Tendency:

1, In statistics, mode, median and mean are typical values which are used to represent measures of central tendency for a set of data in observation.

Mode:

2. The mode is the value that occurs most frequently in a data set.

3. If there is no number in the data set that appears more than once, there is no mode for this set of data.

4. There can be more than 1 mode in some distributions. A set of values with two modes is known as bimodal distribution.

Example: Find the mode(s) of the following set of scores.

14, 11, 15, 9, 11, 15, 11, 7, 13, 12 Solution: The mode is 11 since 11 occurs more times than any other number in the set.

5. If the data is presented in a frequency table, the mode is the discrete value that has the highest frequency. In the case of grouped data, the class interval with the highest frequency is known as the **modal class**.

Median:

6. The **median** is the middle value that divides the data (or observations) into 2 equal parts. In other words, 50% of the observations are below the median and 50% of observations are above the median.

7. To find the median in a set of n values, you must first arrange the set in ascending (or descending) order. There are 2 possible cases to consider when finding the median.

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Case 1: When n is odd (i.e. when the number of data is odd)

The median occurs exactly at the middle position, which is the $\left(\frac{n+1}{2}\right)^{th}$ term. Example: Find the median of the following set of scores in a computer game. 15, 14, 10, 8, 12, 8, 16 **Solution:** First arrange the values in ascending order (or descending order). 8, 8, 10, 12, 14, 15, 16

> Total number of scores = 7 (odd) Middle position = $\frac{7+1}{2}$ = 4th position

... Median = 12 (value in the middle position)

Case 2: When *n* is even (i.e. when the number of data is even)

The median is the average of the two middle values.

Example: Find the median of the following set of scores in a computer game.

15, 14, 10, 8, 12, 8, 16, 13 Solution: First arrange the point values in ascending order (or descending order). 8, 8, 10, 12, 13, 14, 15, 16

> Total number of scores = 8 (even) Middle position = $\frac{8+1}{2}$ = 4.5th position

8, 8, 10, 12, 13, 14, 15, 16 Average of the two middle values

 $\therefore \text{ Median} = \frac{12+13}{2}$ = 12.5 (average of the two middle values)

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Mean:

8. The **mean** is the average of the values. It is obtained by dividing the sum of all values by the number of values, i.e. mean = $\frac{sum of data values}{number of data}$.

9. In general, for a set of numbers $x_1, x_2, x_3, ..., x_n$, the mean \overline{x} is given by $\overline{x} = \frac{x_1 + x_2 + x_3 + ... + x_n}{n}$. Alternatively, the mean \overline{x} is given by $\overline{x} = \frac{\sum fx}{\sum f}$, where $\sum fx$ denotes the sum of fx and $\sum f$ denotes the sum of f.

Example: Find the mean of the following set of integers.

8, 11, 7, 22, 3 Solution: Mean = $\frac{8+11+7+22+3}{5}$ = 10, 2

10. The estimated mean \overline{x} of a set of grouped data is given by $\overline{x} = \frac{\Sigma f x}{\Sigma f}$, where x is the mid-value and f is the frequency of the class interval.

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