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# Assignment - 1

## Central Tendency

Q1 Consider the numbers 2, 3, 4, 5, 5

(a) Compute the mean, median, & mode.

(i) mean : $\bar{X} = \frac{\Sigma x_i}{n} = \frac{2+3+4+5+5}{5} = \frac{19}{5}$

mean = 3.8

(ii) median : $\left(\frac{n+1}{2}\right)^{th}$ term

$\therefore$ median = $\left(\frac{6}{2}\right)^{th}$ term = $3^{rd}$ term

$\therefore$ median = 4//

(iii) Mode : Valve that occurs with greatest frequency

$\therefore$ Mode = 5

(b) If the numbers represented codes for the color of T-shirts ordered from catalog which average(s) would make sense?

-> Mode.

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(c) If the numbers represented one-way mileages for trails to different lakes, which average(s) would make sense.

→ Mean, Median & mode.

(d) Suppose the numbers represent survey response from 1 to 5, with 1 - disagree strongly, 2 - disagree, 3 - agree, 4 - agree strongly, 5 - agree very strongly. Which average make sense:

→ Mode & Median

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Q2 Consider a data set of 15 distinct measurement with mean A and median B.

(a) If the highest number were increased, what would be the effect on the median and mean? Explain.

→ As the highest number is increased the value of $\Sigma x_i$ will also increase. So, the mean would increase while the median would remain the same.

(b) If the higest number were decreased to a value still larger than B, what would be the effect on the median and mean?

→ As the highest number is decreased the value of $\Sigma x_i$ will also decreased so the mean would decrease while median would remain the same.

(c) If the highest number were decreased to a value smaller than B, what would be the effect on the median & mean?

→ As the highest number is decreased to a value smaller than B, Both mean and median would decrease.

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Q3 Consider the data set 2, 2, 3, 6, 10

(a) Compute the mode, median & mean.

→ mode : Value that occurs with greatest frequency.

mode = 2//

→ median : $\left(\frac{n+1}{2}\right)^{th}$ term $= \left(\frac{6}{2}\right)^{th}$ term

$= 3^{rd}$ term

median = 3//

→ mean : $\bar{x} = \frac{\Sigma x_i}{n} = \frac{2+2+3+6+10}{5}$

$\therefore \bar{x} = \frac{23}{6} = 4.6$//

(b) Multiply each data value by 5 compute the mode, median and mean.

→ New data value : 10, 10, 15, 30, 50

Mode = 10//

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Median $= \left(\frac{6}{2}\right)^{th}$ term $= 3^{rd}$ term

$= 15$ //

Mean $= \bar{x} = 23$

(c) Compare the results of part (a) & (b)

→ In part (a) mode $= 22$
After multiplying each data value by 5 in part (b) Mode $= 10$

In part (a) Median $= 3$
After multiplying each data value by 5 in part (b) Median $= 15$

In part (a) Mean $= 4.6$
After multiplying each data value by 5 in part (b) Mean $= 23$

- In General when each data value in a set is multiply by same constant, the result of mean, median & mode is same if multiplied by the same constant.

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(d) Suppose you have information about average heights of a random sample of airplane passangers. The mode is 70 inches, the median is 68 inches and the mean is 71 inches. To convert the data into cms. multiply each data ~~mt~~ value by 2.54. What are the values of the mode, median and mean in cms?

→ So, the value of mode, median & mean in centimeters are.

Mode = 70 × 2.54 = 177.8 cms
Median = 68 × 2.54 = 172.72 cms
Mean = 71 × 2.54 = 180.34 cms.

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Qn. Consider the data set 2, 2, 3, 6, 10

(a) Compute the mean, median & mode.

$$\text{mean} = \frac{2+2+3+6+10}{5} = \frac{23}{5} = 4.6 //$$

$$\text{Median} = \left(\frac{6}{2}\right)^{th} \text{term} = 3^{rd} \text{term} = 3 //$$

mode :- Greatest frequency data = 2 //

(b) Add 5 to each data value. And compute Mean, median & mode.

new data : 7, 7, 8, 11, 15

$$\text{Mean} = \frac{7+7+8+11+15}{5} = \frac{48}{5} = 9.6 //$$

$$\text{Median} = \left(\frac{n+1}{2}\right) = \left(\frac{6}{2}\right) = 3^{rd} \text{tm} = 8 //$$

mode = Greatest frequency data = 7 //

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(c) compare the result of part (a) & (b)

→ In part (a) mean = 4.6
After adding 5 to each data value in part (b) mean = 9.6

→ In part (a) median = 3
After adding 5 to each data value in part (b) median = 8

→ In part (a) mode = 2
After adding 5 to each data value in part (b) mode = 7

In General when the same constant is added to each data value, the result of mean, median and mode is also same if added by the same constant.

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Q5 Environmental Studies:

The following data are taken from a study conducted by the National park system, of which Death valley is a unit.

The ground temperatures (°F) were taken from May to Nov in the vicinity of furnance creek.

146, 152, 168, 174, 180, 178, 179, 180, 178, 178, 168, 165, 152, 144.

Compute the mean median & mode for these ground temperatures.

→ Mean $= \frac{\Sigma x_i}{n} = \frac{2342}{14} = 167.28$ //

Median = (For even) $\left(\frac{\left(\frac{n}{2}\right) + \left(\frac{n+1}{2}\right)}{2}\right)^{th}$ term

$\therefore \frac{7^{th} \text{ term} + 8^{th} \text{ term}}{2} = \frac{168 + 174}{2}$

$\therefore$ 171 //

Mode = 178 //

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Q6 The following information is from a random sample of winter wolf Packs in region of Alaska, minnesto, Michigan, Wisconsin, canada & Finland

winter Pack size : 13, 10, 7, 5, 7, 7, 2, 4, 3, 2, 3, 15, 4, 4, 2, 8, 7, 8

→ mean : $\bar{x} = \frac{\Sigma x_i}{n} = \frac{111}{18} = 6.16$

→ Median : $\frac{9^{th} \text{ term} + 10^{th} \text{ term}}{2} = \frac{5+7}{2}$

$\therefore \frac{12}{2} = 6$ //

Median = 6 //

→ Mode = 7 //

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Q7 Upper canyon: 2, 3, 1, 1, 3, 4, 6, 9, 3, 1, 3

lower canyon : 8, 1, 1, 0.6, 7, 2, 14, 3, 0, 1, 13, 2, 1

(a) Compute mean, median & mode for upper

→ Mean: $\frac{\Sigma x_i}{n} = \frac{36}{11} = 3.27$

→ Median = $\left(\frac{n+1}{2}\right)^{th}$ term = $\frac{12}{2} = 6^{th}$ term

median = 4

→ Mode = 3

(b) Compute mean, median & mode for Lower

→ Mean = $\frac{\Sigma x_i}{n} = \frac{59}{14} = 4.21$

→ median = $\frac{\left(\frac{n}{2}\right) + \left(\frac{n+1}{2}\right)}{2} = \frac{7^{th} \text{ term} + 8^{th} \text{ term}}{2}$

$= \frac{2+14}{2} = 8$

→ Mode = 1

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(c) Compare the results of part (a) & (b).

→ The mean of upper canyon : 3.27
The mean of lower canyon : 4.21

→ The median of upper canyon : 4
The median of lower canyon : 8

→ The mode of upper canyon = 3
The mode of lower canyon = 1

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Q8 Costs in dollars per day in Island of Mavi

89, 50, 68, 60, 375, 55, 500, 71, 40, 350, 60, 50
250, 45, 45, 125, 235, 65, 60, 130

(a) Compute the mean, median & mode for the data.

→ Mean : $\bar{x} = \frac{\sum x_i}{n} = \frac{2723}{20} = 136.15$//

→ median: $\frac{\left(\frac{n}{2}\right) + \left(\frac{n+1}{2}\right)}{2} = \frac{10^{th} \text{ term} + 11^{th} \text{ term}}{2}$

$= \frac{65 + 68}{2} = 66.5$//

→ Mode : 60//