11.2. Measures of Central Tendency.

Monday, April 16, 2018 1:06 PM

Goals: ① Calculate the mean [ungrouped data. / grouped data.

② Calculate the median [ungrouped data. / grouped data.

③ Calculate the mode.

E.g. 1, 2, 3, 4. Find the mean?

$$\text{Mean} = \frac{1+2+3+4}{4} = 2.5$$

The mean of ungrouped data is the sum of all the numbers divided by the number of numbers

E.g. Salaries (in thousands) of 5 employers:

14, 17, 21, 18, 15.

Find the mean salary. $= \frac{14+17+21+18+15}{5}$

$= 17.$

Mean of grouped data:

Class interval	Midpoint x_i	Freq.	$x_i \cdot f_i$
[0,7)	3.5	0	0
[7,14)	10.5	2	21
[14,21)	17.5	10	175
[21,28)	24.5	21	514.5
[28,35)	31.5	23	724.5
[35,42)	38.5	14	539
[42,49)	45.5	5	227.5
		75	2201.5

$$\text{Mean} = \frac{2201.5}{75} \approx 29.35$$

$$\text{Mean of grouped data} = \boxed{\frac{\sum x_i \cdot f_i}{n}}$$

x_i = midpoint of the i^{th} class interval

f_i = freq. of the i^{th} class interval

n = total # of data points = $\sum f_i$

Median of ungrouped data.

The median is the number that divides the bottom 50% of the data from the top 50% of data.

E.g. 17, 21, 14, 15, 18

Find the median?

Step 1: Arrange the data in ascending order.

14, 15, 17, 18, 21.

Step 2: Median = 17.

In this case there is a number in the middle b/c there is an odd number of data points.

What if we have an even number of data points?

For eg. 14, 15, 17, 19, 23, 25

→ Take the average of the 3rd & 4th number:

$$\text{Median} = \frac{17 + 19}{2} = 18$$

Mode: the mode is the most frequently occuring value in the data set.

E.g. 45, 47, 47, 68, 69, 70, 70, 72, 72, 72, 73, 75, 98, 98, 100, 100, 100

Mode = 72 and 100.

Ex. Find the median and mode of the given data set

1. 4, 5, 5, 5, 5, 6, 7, 8, 12 — Mode = 5; Median = 5
2. 1, 2, 3, 3, 3, 5, 7, 7, 7, 23 — Mode = 3 and 7; Median = 4
3. 1, 3, 5, 6, 7, 9, 11, 15 — Mode = all of them; Median = 6.5

Median of grouped data:

Class Interval	Freq.	Cum. Freq.
3.5 - 4.5	3	3
4.5 - 5.5	1	4
5.5 - 6.5	2	6
6.5 - 7.5	4	10
7.5 - 8.5	3	13
8.5 - 9.5	2	15
	15