

## S.2 Measures of Central Tendency

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### S.2 Measures of Central Tendency: Raw Data

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A measure of "central tendency" is a number that is representative of a set of data. It speaks for the data set as a whole – in the "aggregate". Three common measures are used:

mean  $\bar{X}$ :      add all the values in the set and divide by the number of values       $\bar{X} = \frac{\sum_{i=1}^k f_i x_i}{n}$

- the mean is greatly affected [skewed] by extreme values in the data

median:            the middle value of a set of ordered data

- if there is an odd number of values, it is the middle value
- if there is an even number of values, it is the average of the two middle values
- the median is not affected by extreme values in the data: stable
- but it does not indicate the range of values below or above it

mode:              the most frequent value of a set of data

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Find the mean, median, and mode of the following sets of data. Explain which measure seems most representative of the set of data.

Salaries:

54,000

75,000

55,000

62,000

[ 226,000 ]

65,000

59,000

61,000

59,000

162,000

$$\text{mean } (\bar{x}) = 87,800$$

$$\text{median} = 61,500 \leftarrow$$

$$\text{mode} = 59,000$$

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Hours slept the night before a final exam:

8	6	5	6	4	3	5	8	7	7
5	6	2	0	7	5	6	6	7	8

$$\bar{X} = 5.55$$

$$\text{median} = 6$$

$$\text{mode} = 6$$

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Weights of Women's Running shoes:

9.1	11.3	10.9	12.3	11.1	10.6	12.5	13.5	11.0	13.0	10.8	11.0	9.7
11.0	10.5	10.4	10.0	14.0	11.5	11.5	10.5	10.5	10.3	11.7	11.6	

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Rowdy Rho fraternity is in danger of losing campus approval if it does not raise the mean GPA of the group to 2.2 on a 4-point scale. You're looking to join the fraternity. Given the scores below what score would you have to get to help Rowdy Rho fraternity reach a 2.2 average?

1.8 2.0 2.0 2.0 2.0 1.9 1.8  
2.3 2.5 2.3 1.9 2.2 2.0 2.3

$x$

$$2.2 = \frac{29 + x}{15}$$

$$x = 4.0$$

### **S.2 Measures of Central Tendency: Grouped Data**

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To find the mean of grouped data, we consider each point in the class to have the same value – the class mark. Find the subtotal for each class using  $\boxed{\text{class mark} \times f}$ . Then add the subtotals for all the classes. Finally, divide that total by the number of data points – not by the number of classes!

To find the median of grouped data, we use the cumulative frequency to find the class that contains the middle data value. The class mark for that class is considered the median.

To find the mode of grouped data, we choose the class that has the most data values.

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Recovery Time from Injury [weeks]	Number of Athletes
1	5
2	8
3	12
<u>30-31</u> 4	19
5	7
6	4
7	3
8	2

total: 60

mean:

$$\frac{5 + 16 + 36 + 76 + 35 + 24 + 21 + 14}{60}$$

$$\bar{x} = 3.8 \text{ weeks}$$

median = 4 wks.

mode = 4 wks.



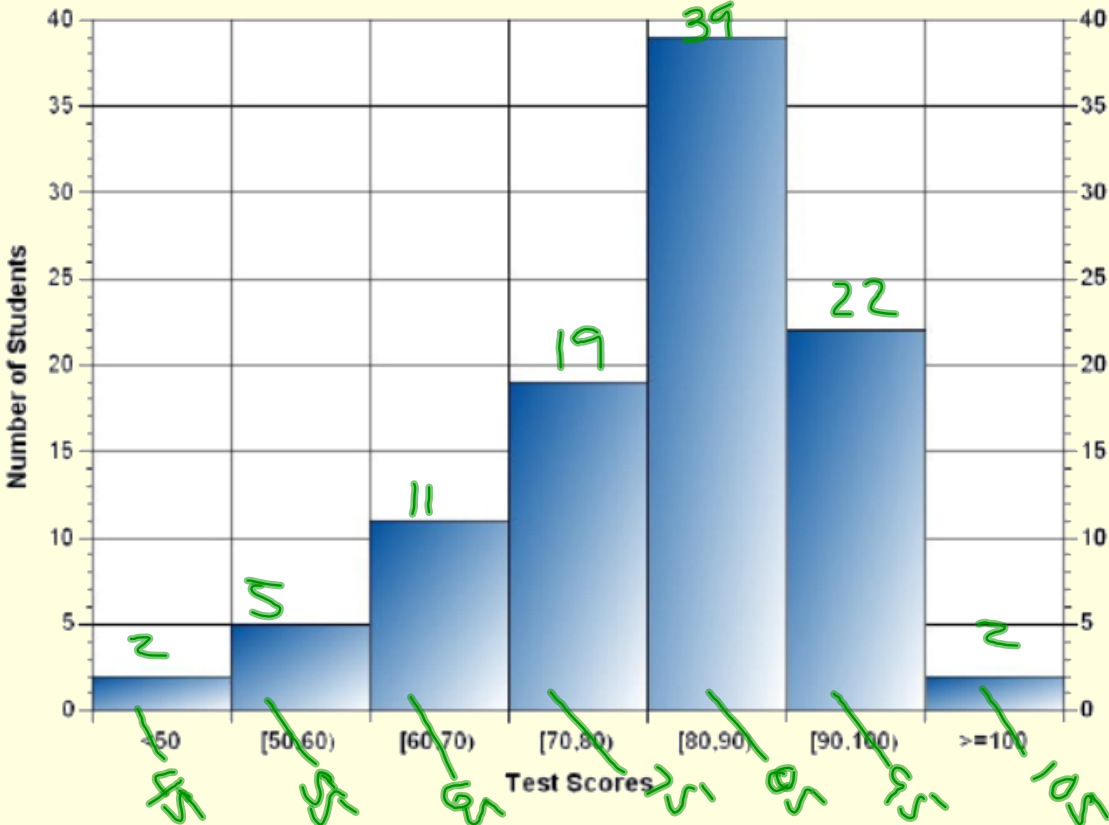
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Distance Walked <i>miles</i>	Number of Walkers
1-5	3
6-10	8
11-15	13
16-20	10
21-25	6

total: 50

Median = 13

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