

Section 3.1 – Measures of Center

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Outline

Measures of Center

Properties of the measures

Means of Frequency Distributions

Weighted Mean

Measures of Center

Measure of center

Definition (Measure of Center)

A **measure of center** is a value at the center or middle of a data set.

Notation

Symbol	Meaning
\sum	The sum of a set of data values
x_i	A variable used to represent the individual data values
n	The number of data values in the <i>sample</i>
N	The number of data values in the <i>population</i>
$\sum x_i$	The sum of a all values.

Mean

Definition (Sample Mean)

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$$\mu = \frac{\sum x_i}{N}$$

Example

I just purchased 5 video games for a mean price of \$19.42. Four of the games cost me \$20.00 each. How much did the fifth one cost?

Median

Definition (Median)

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Calculating the Median

After sorting the data, use one of the following options.

1. If the number of data values is odd, the median is the number located in the exact middle.
2. If the number of data values is even, the median is the mean of the middle two numbers on the list.

IQ Scores

Table 1: IQ Scores from the low lead group

50	56	70	72	73	74	75	76	76	76	76	76	77
77	78	80	80	80	84	85	85	85	85	86	86	86
86	87	87	88	88	88	89	89	89	91	92	93	94
94	94	95	96	96	96	96	96	96	96	97	97	98
99	99	99	99	100	101	101	102	104	104	105	105	106
107	107	107	107	108	111	115	115	118	120	125	128	141

Table 2: IQ Scores from the high lead group

75	75	76	79	80	80	82
83	85	85	88	88	88	89
90	93	94	96	101	104	104

Definition (Mode)

The **mode** of a data set is the value that occurs with the greatest frequency.

- When two values occur with the same greatest frequency, each one is a mode and the data set is **bimodal**
- When more than two values occur with the same greatest frequency, each is a mode and the data set is **multimodal**
- When no data value is repeated, there is no mode.

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Properties of the measures

Properties of the mean

1. The mean uses every data value.
2. The mean is not **resistant**

Properties of the median

1. The median does not use every data value.
2. The median is very resistant.

Means of Frequency Distributions

Computing the Mean From a Frequency Distribution

Formula

$$\bar{x} = \frac{\sum(f_i \cdot x_i)}{\sum f_i}$$

- x is the midpoint of each class.

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- $f \cdot x$ is the frequency of a class times the midpoint.

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- $\sum f$ is the sum of all frequencies

IQ Scores

Class	Frequency
50 - 69	2
70 - 89	33
90 - 109	35
110 - 129	7
130 - 149	1

IQ Scores

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Real mean: 92.8

Weighted Mean

Calculating a Weighted Mean

Formula

$$\text{weighted mean} = \frac{\sum(w_i \cdot x_i)}{\sum w_i}$$

Grade for this class.

Category	Weight	Average
Homework	25%	85.1
Quizzes	10%	82.4
Participation	5%	100.0
Exams	60%	76.8