Section 3.1 – Measures of Center

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Outline

Measures 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 *sample*
N	The number of data values in the *population*
$\sum x_i$	The sum of a all values.

Definition (Sample Mean)

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

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.

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		

IQ Scores

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

Mode

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

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

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

- x_i is the midpoint of each class.

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- $f_i \cdot x_i$ is the frequency of a class times the midpoint.

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- $\sum f_i$ 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

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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