

**Statistics 1:
Introduction to
Probability and Statistics**
Section 3-2

Chapter 3

- **Describing data**
- **Exploring data**
- **Comparing data**

Descriptive Statistics

- **Distribution**
- **Center**
- **Variation**
- **Position**

Distribution

- **Frequency tables**
- **Pictures**

Descriptive Statistics

- **Distribution**
- **Center**
- **Variation**
- **Position**

Four Statistics Describing the Center

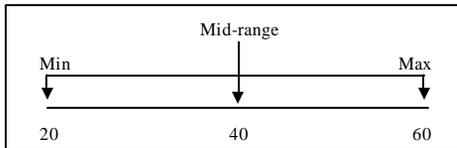
- **Mean**
- **Median**
- **Mode**
- **Midrange**

Four Statistics Describing the Center

- We will take them in this order
- Mid-range
- Mode
- Mean
- Median

The Mid-Range

- Halfway between the highest and lowest values
- $(\text{maximum} + \text{minimum})/2$



The Mid-Range

Data

9, 23, 12, 6, 4, 17, 76

Sorted Order

4, 6, 9, 12, 17, 23, 76

- Minimum = 4
- Maximum = 76
- Midrange = $(76 + 4)/2 = 80/2 = 40$

The Mode

- **The most frequent value**
- **No mode when all values occur only once**
- **There are multiple modes when more than one value is equally the most common**

The Mean

- **The average**
- **The center of gravity**
- **Calculation**
 - **divide the total of the values by the count of the values**

The Mean

- **Formula**

$$\bar{x} = \frac{\sum x}{n} = \frac{\sum_{i=1}^n x_i}{n}$$

- **For the set**

$$\{x : x_1, x_2, x_3, \dots, x_n\}$$

The Mean

- **For a summary in a Frequency Table**

$$\sum (f \cdot x) \div \sum f$$

where f is the frequency
and x is the class midpoint

The Mean

- **For a summary in a Frequency Table**
 - Example of “weighted average”
 - Why does this work?
 - Does the calculation produce the mean of the original data?

The Median

- **The value “in the middle” of the sorted order**
 - if N is odd, then the median is the unique value in the middle
 - if N is even, then the median is the average of the middle 2 values

Symbols for Sample Statistics

- Mean = \bar{x}
- Standard Deviation = s
- Variance = s^2

Symbols for Population Parameters

- Mean = μ
- Standard Deviation = σ
- Variance = σ^2
