

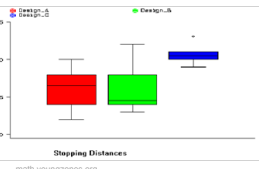
Exploring Data with Graphs and Numerical Summaries | 2

2.5 How Measures of Position Describe Spread

Aug 8-9:18 AM

### Learning Objectives

- Obtaining **quartiles** and **5 number summary**
- Calculating **interquartile range** and detecting potential **outliers**
- Drawing **boxplots**
- Comparing distributions
- Calculating a **z-score**

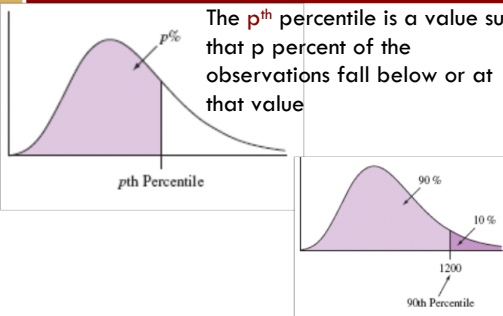


math.youngzones.org

Aug 8-9:18 AM

### Percentile

The  $p^{\text{th}}$  percentile is a value such that  $p$  percent of the observations fall below or at that value

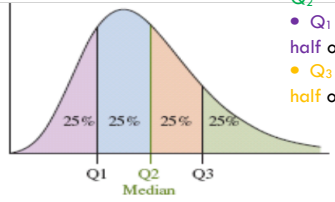


Aug 8-9:18 AM

### Finding Quartiles

Splits the data into four parts

- Arrange data in order
- The **median** is the second quartile,  $Q_2$
- $Q_1$  is the **median of the lower half** of the observations
- $Q_3$  is the **median of the upper half** of the observations



Aug 8-9:18 AM

### Measure of Spread: Quartiles

Quartiles divide a ranked data set into four equal parts:

- 25% of the data at or below  $Q_1$  and 75% above
- 50% of the obs are above the median and 50% are below
- 75% of the data at or below  $Q_3$  and 25% above

|    |     |
|----|-----|
| 1  | 0.6 |
| 2  | 1.2 |
| 3  | 1.6 |
| 4  | 1.9 |
| 5  | 1.5 |
| 6  | 2.1 |
| 7  | 2.3 |
| 8  | 2.3 |
| 9  | 2.5 |
| 10 | 2.8 |
| 11 | 2.9 |
| 12 | 3.3 |
| 13 | 3.4 |
| 14 | 3.6 |
| 15 | 3.7 |
| 16 | 3.8 |
| 17 | 3.9 |
| 18 | 4.1 |
| 19 | 4.2 |
| 20 | 4.5 |
| 21 | 4.7 |
| 22 | 4.9 |
| 23 | 5.3 |
| 24 | 5.6 |
| 25 | 6.1 |

$Q_1 = \text{first quartile} = 2.2$

$M = \text{median} = 3.4$

$Q_3 = \text{third quartile} = 4.35$

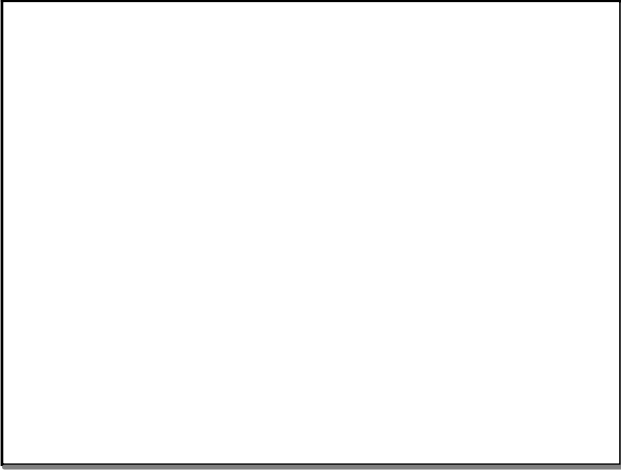
Aug 8-9:18 AM

2.64 **European unemployment:** In recent years many European nations have suffered from relatively high unemployment. For the 15 nations that made up the European Union in 2003, the table shows the unemployment rates reported by Eurostat as of January 2007.

- Find and interpret the median.
- Find the first quartile ( $Q_1$ ) and the third quartile ( $Q_3$ ).
- Find and interpret the mean.

|             |                 |             |
|-------------|-----------------|-------------|
| Belgium 7.8 | France 8.4      | Italy 6.7   |
| Denmark 3.2 | Portugal 7.2    | Finland 7.0 |
| Germany 7.7 | Netherlands 3.6 | Austria 4.5 |
| Greece 8.7  | Luxembourg 5.0  | Sweden 6.0  |
| Spain 8.6   | Ireland 4.4     | U.K. 5.4    |

Aug 8-9:18 AM



Aug 14-3:16 PM