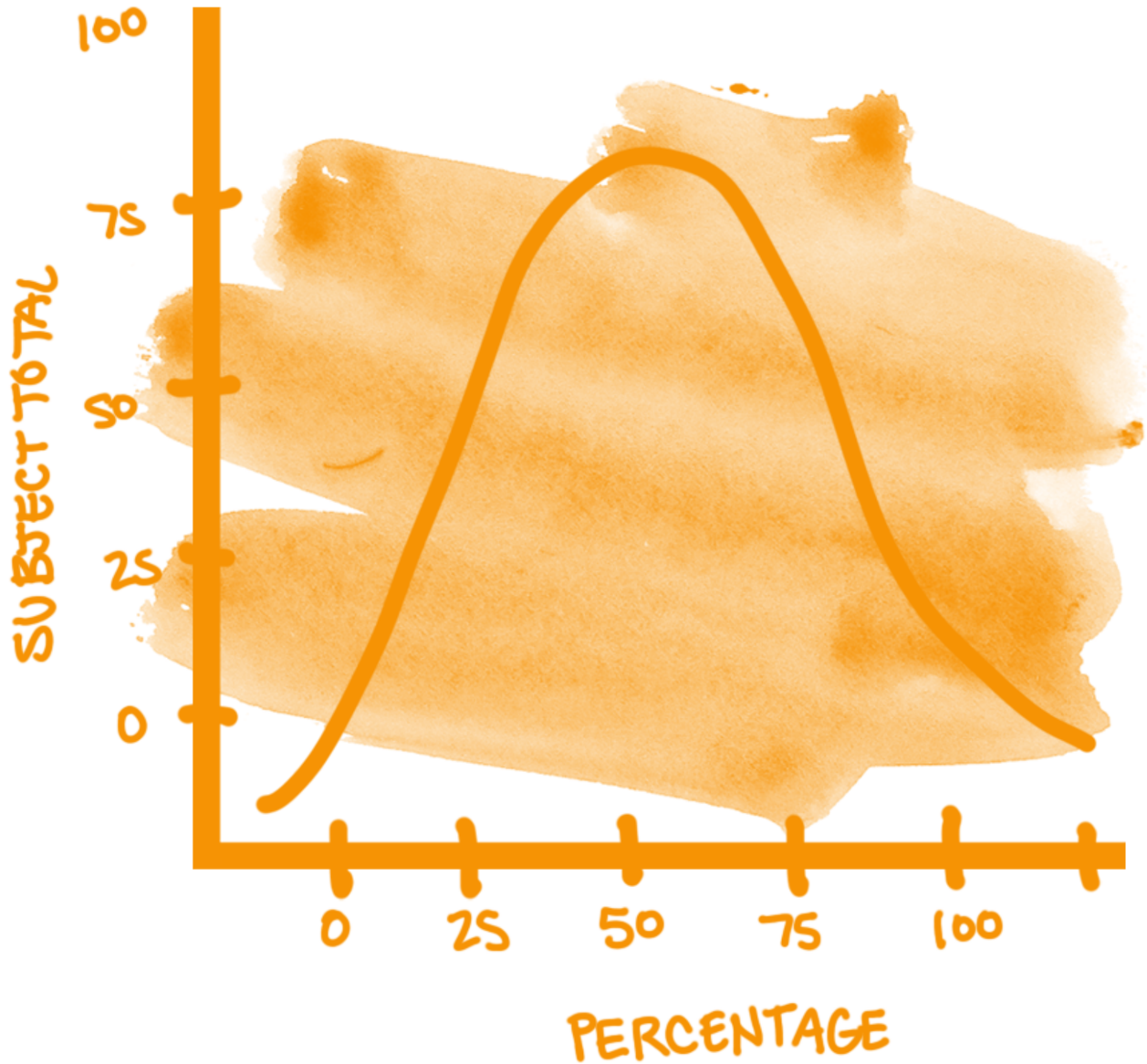
Statistical Reasoning: Describing Data Part 1



steven j. barnes

Learning Goals

- Explain the difference between descriptive and inferential statistics.
- Be able to calculate the mean, median, and mode given a data set.
- Understand what is meant by the word ‘average.’

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Statistical Methods

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1. Descriptive Statistics: Statistics that are used to help organize/summarize data.

2. Inferential Statistics: Statistics that allow a researcher to make inferences about the characteristics of a population, based on the characteristics of a representative sample taken from that population.

Statistical Methods

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Descriptive Statistics

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1. Measures of central tendency.
2. Measures of variability.
3. Measures of correlation.

Descriptive Statistics

Measures of Central Tendency

1
2
6
3
5
5
6
4
2
4
5
3
2
7
1

Descriptive Statistics

Measures of Central Tendency

1
2 The mean is the total of all the scores divided by the total
6
3 number of scores.
5
5
6
4
2
4
5
3
2
7
1

Descriptive Statistics

Measures of Central Tendency

The mean is the total of all the scores divided by the total number of scores.

```
  1
+2
+6
+3
+5
+5
+6
+4
+2
 +4
 +5
 +3
 +2
 +7
 +1
----
 = 56
```

Descriptive Statistics

Measures of Central Tendency

The mean is the total of all the scores divided by the total number of scores.

Mean = 56/15 = 3.73

1
+2
+6
+3
+5
+5
+6
+4
+2
+4
+5
+3
+2
+7
+1
= 56

Descriptive Statistics

Measures of Central Tendency

1
2 The median is the "center" score once we rank the scores.
6
3
5
5
6
4
2
4
5
3
2
7
1

Descriptive Statistics

Measures of Central Tendency

1
1 The median is the "center" score once we rank the scores.
2
2
2
3
3
4
4
5
5
5
6
6
7

Descriptive Statistics

Measures of Central Tendency

The median is the "center" score once we rank the scores.

1
1
2
2
2
3
3
4 ← Median = 4
4
5
5
5
6
6
7

Descriptive Statistics

Measures of Central Tendency

1
1
1
2
2
2
3
3
4
4
5
5
5
6
6
7

The mode is the most frequent score.

Descriptive Statistics

Measures of Central Tendency

The mode is the most frequent score.

Descriptive Statistics

Measures of Central Tendency

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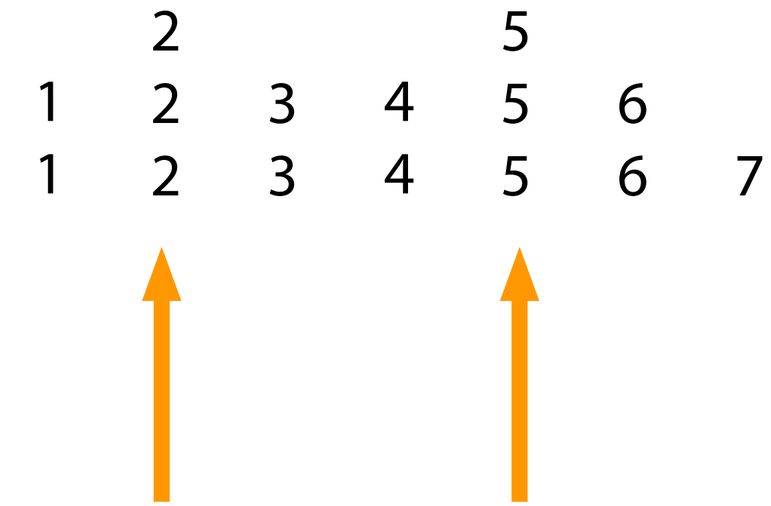
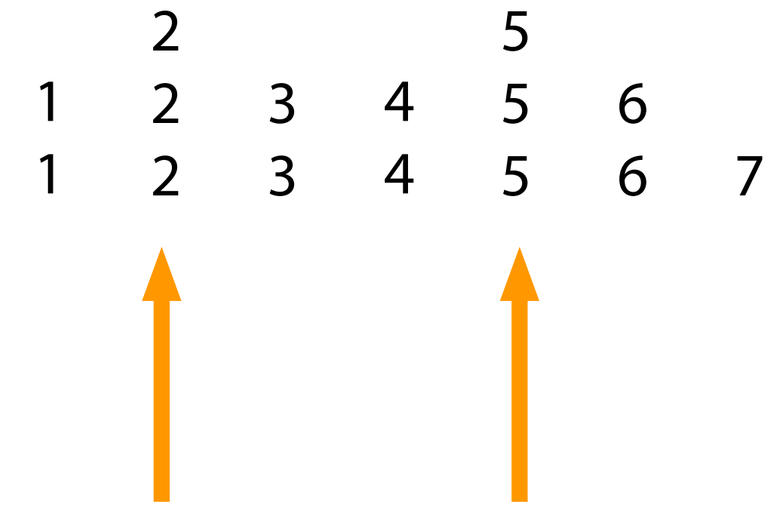


Descriptive Statistics

Measures of Central Tendency

The mode is the most frequent score.

This is a bimodal distribution.

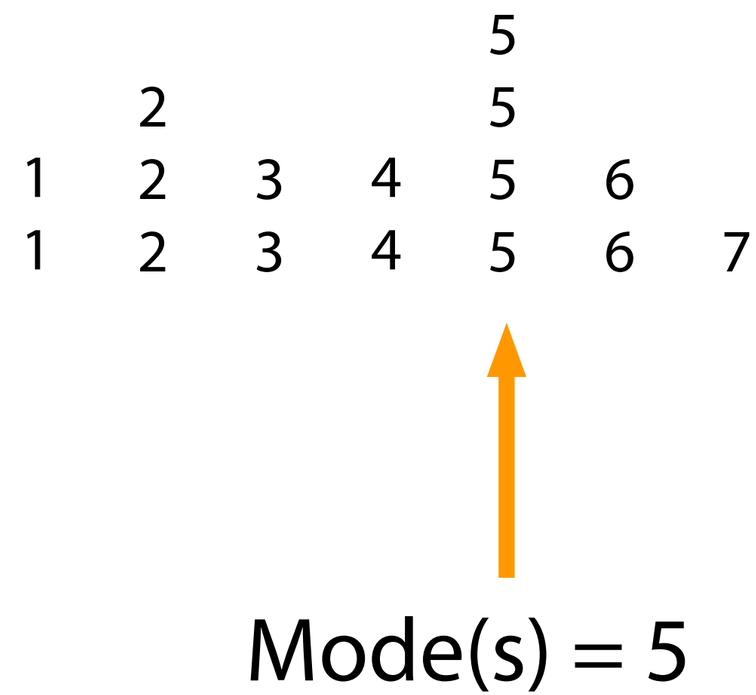


Mode(s) = 2 and 5

Descriptive Statistics

Measures of Central Tendency

The mode is the most frequent score.

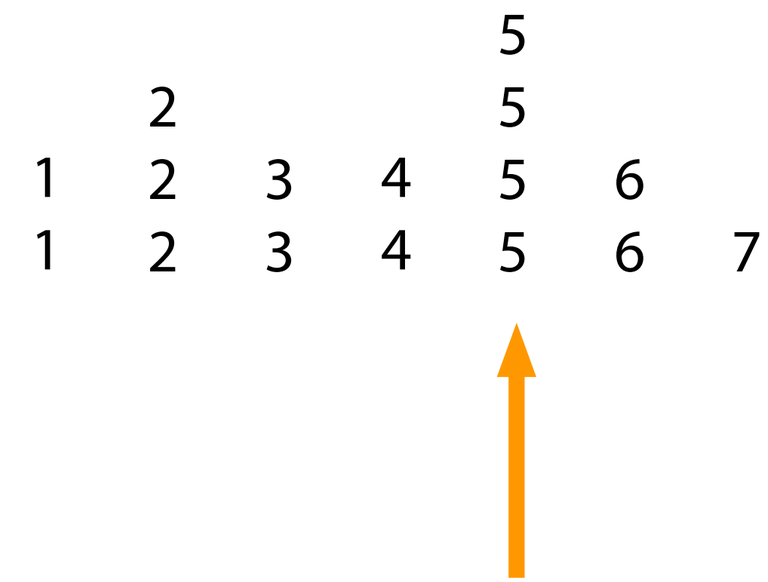


Descriptive Statistics

Measures of Central Tendency

The mode is the most frequent score.

This is a unimodal distribution.

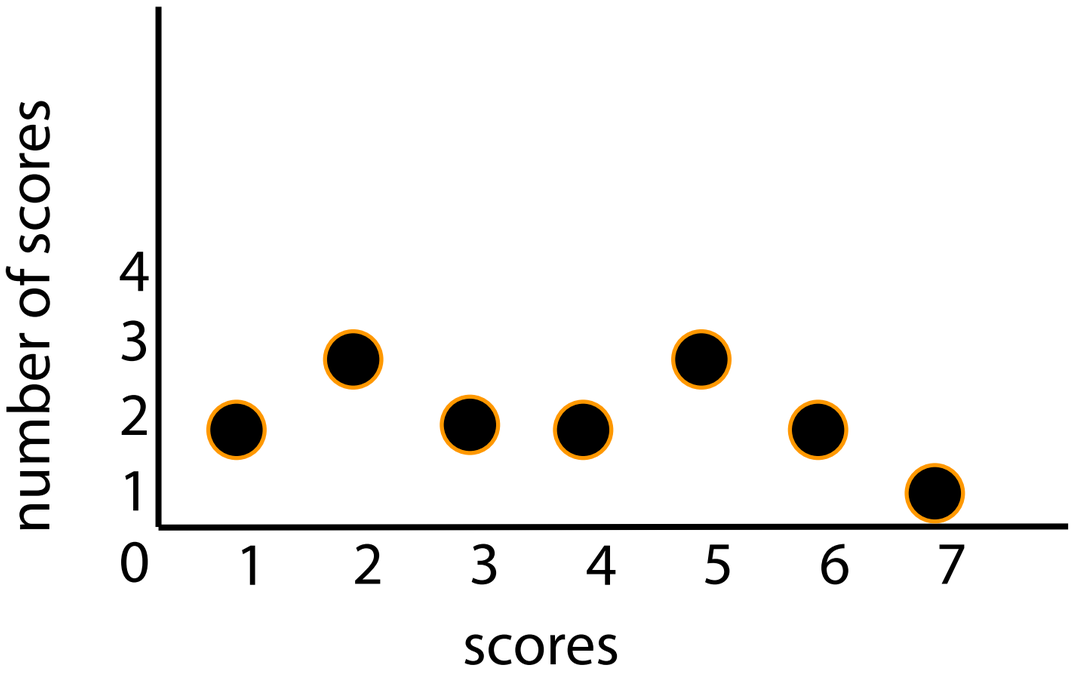


Descriptive Statistics

Measures of Central Tendency

Descriptive Statistics

Measures of Central Tendency



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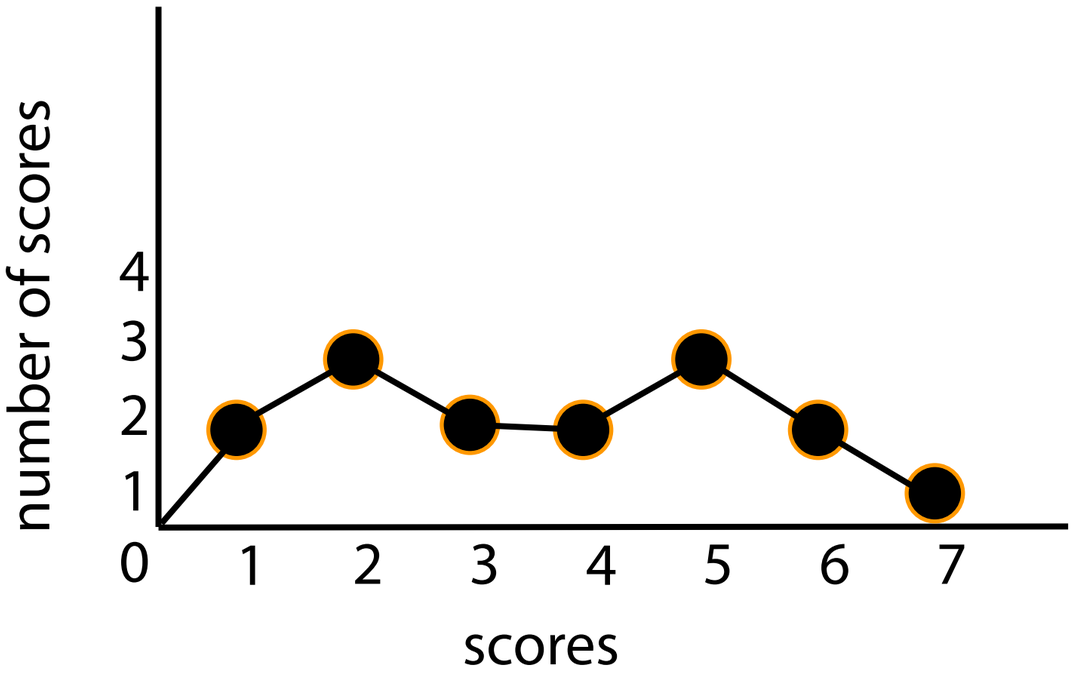
Measures of Central Tendency



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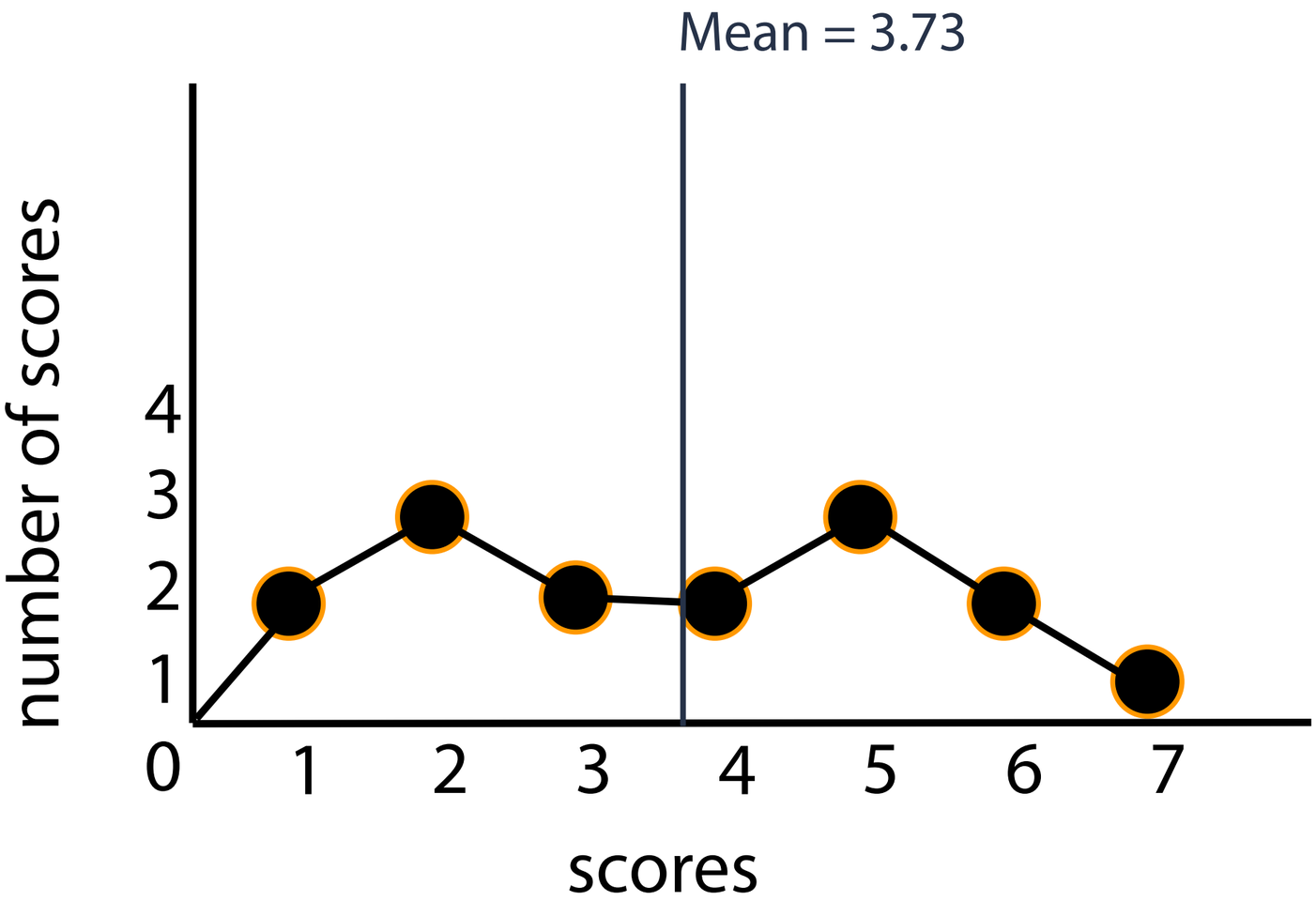

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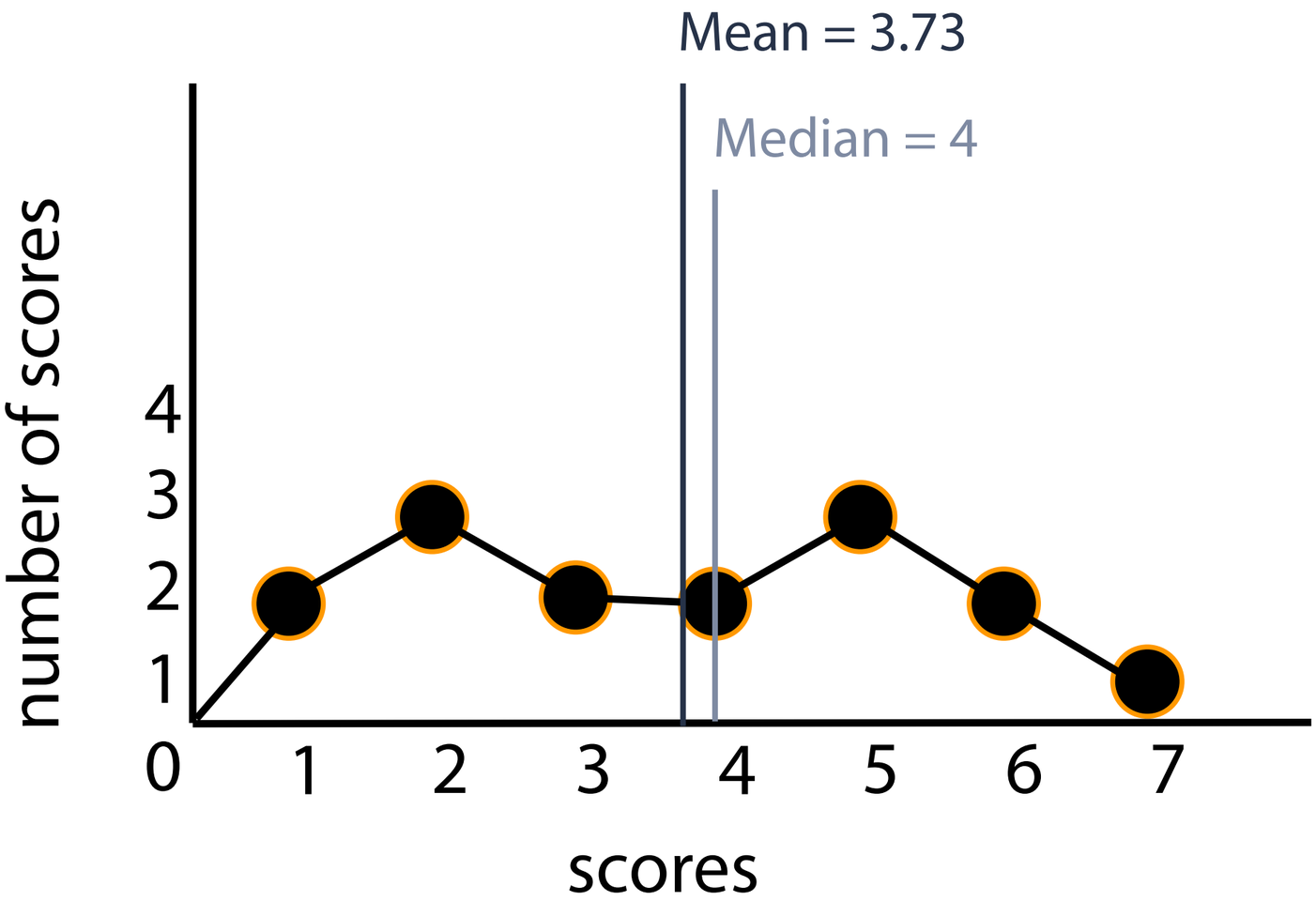
Measures of Central Tendency



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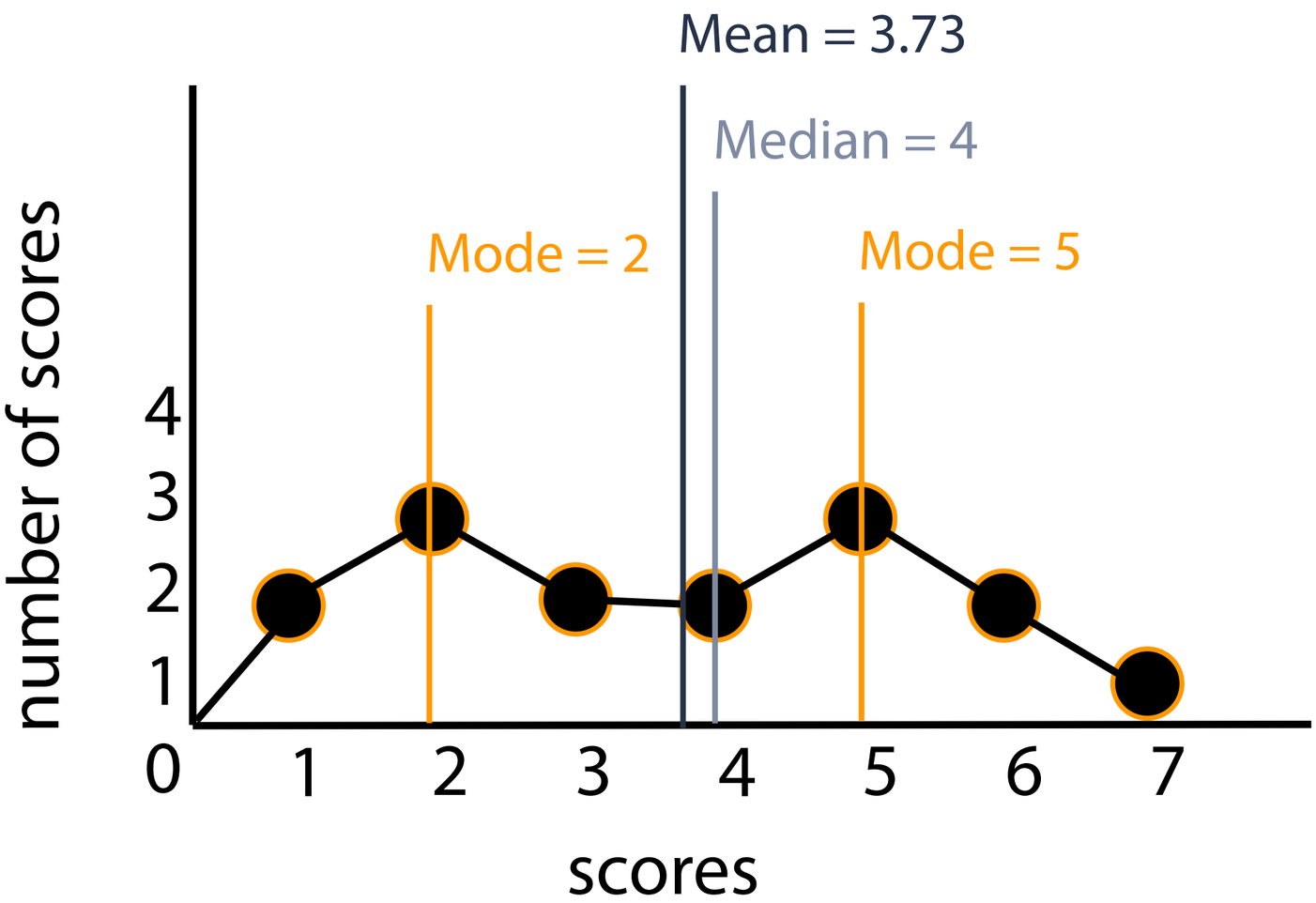
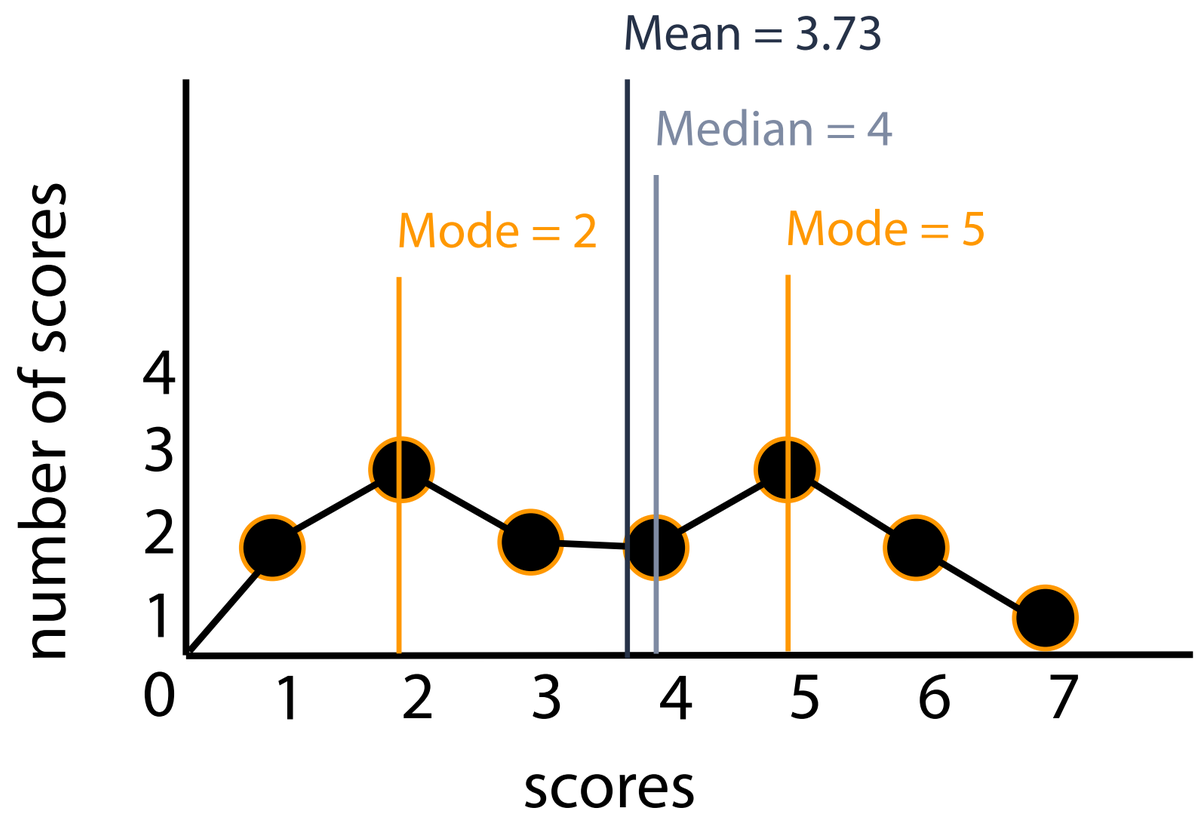


Descriptive Statistics

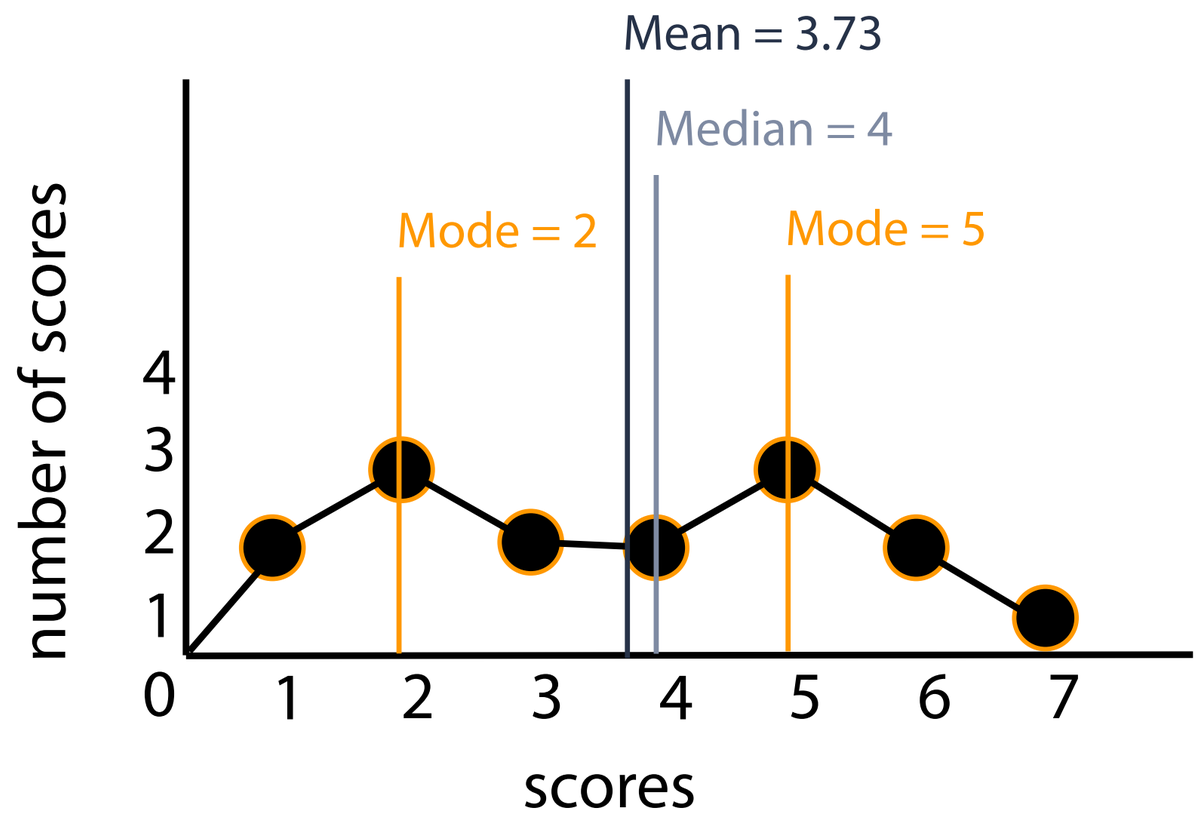
Measures of Central Tendency



So which one of these do we mean when we say ‘average’?

Descriptive Statistics

Measures of Central Tendency



So which one of these do we mean when we say ‘average’?

Any of the above!

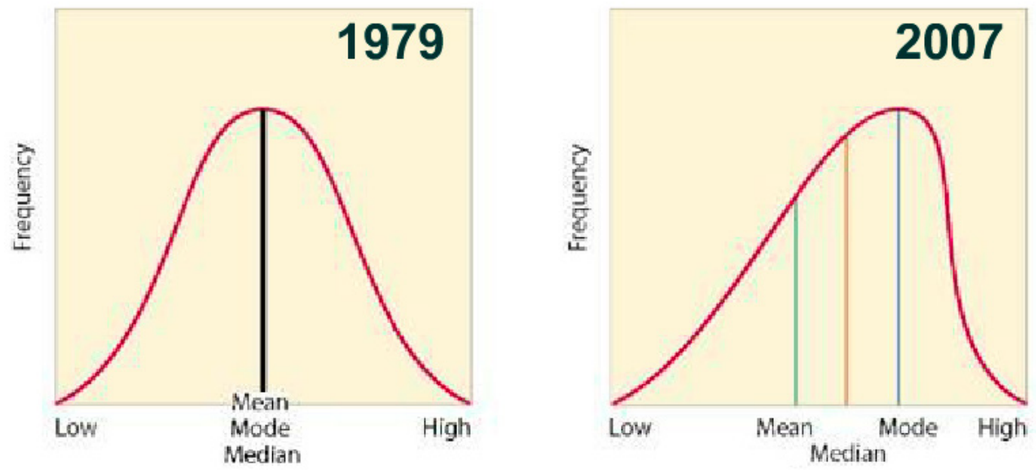
Descriptive Statistics

Measures of Central Tendency

The ambiguity in the word ‘average’ can be useful in certain do-mains.

Measures of Central Tendency

The ambiguity in the word 'average' can be useful in certain domains.



"The average number of guns per household has increased!"

"The average number of guns per household hasn't changed!"

"The average number of guns per household has decreased!"

Descriptive Statistics