# Data Types

# Objectives

1. Distinguish between qualitative and quantitative data
2. Determine if data is discrete or continuous
3. Classify data by its level of measurement

# Qualitative Data

**Qualitative Data**

**Qualitative data** (a.k.a. *categorical data*) is data that is based on some quality or characteristic.

For instance:

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- Your name
- Blood type

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For instance:

- Your name
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- Zip code

# Quantitative Data

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Not all numeric data is quantitative.

If two data values can be added together (or subtracted) to produce **meaningful** results, then the data is quantitative. Else, it is qualitative.

# Example 1

Determine if each of the following represents qualitative or quantitative data.

(a) The amount of water a household uses in a month.

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(b) Each student's favorite color in a statistics class.

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(a) The amount of water a household uses in a month.

If we add (or subtract) two households' water usage, we obtain meaningful results; this data is quantitative.

(b) Each student's favorite color in a statistics class.

Favorite color is a qualitative data value.

# Example 1

(c) Social security numbers.

If we add (or subtract) two Social Security numbers, we do not produce meaningful results. Thus, SSNs are qualitative.

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(d) How much money you have on you right now.

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If we add (or subtract) two Social Security numbers, we do not produce meaningful results. Thus, SSNs are qualitative.

(d) How much money you have on you right now.

If we add (or subtract) two of these data values, we get meaningful results; this data is quantitative.

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# Subgroups of Quantitative Data

Within the realm of quantitative data, there are two types: discrete and continuous.

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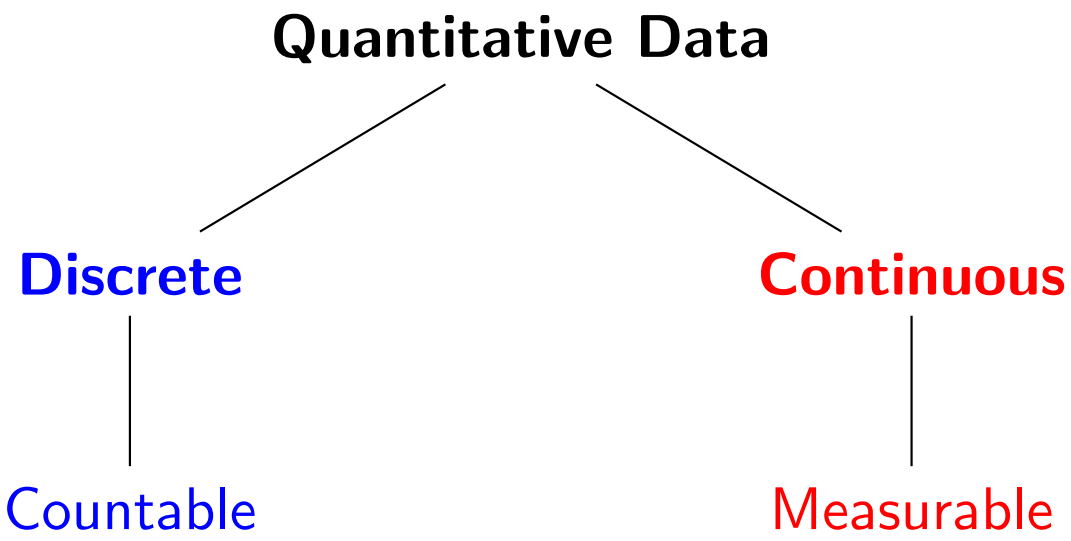

# Example 2

Determine whether each quantiative variable is discrete or continuous.

(a) Number of free throws made.

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Determine whether each quantiative variable is discrete or continuous.

(a) Number of free throws made. Discrete

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Determine whether each quantiative variable is discrete or continuous.

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(b) Time it takes to finish a book.

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(d) The amount of money in a retirement account.

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(a) Number of free throws made. Discrete

(b) Time it takes to finish a book. Continuous

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(d) The amount of money in a retirement account. Discrete

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# Nominal Level of Measurement

In addition to qualitative and quantitative (and the quantitative subgroups discrete and continuous), there are 4 different levels of measurement of data.

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**Nominal Level of Data**

The **nominal level of measurement** involves only categorical data; the data can't be arranged in a meaningful order.

# Ordinal Level of Measurement

## Ordinal Level of Data

The **ordinal level of measurement** involves data that can be arranged in a meaningful order, but differences in data values can't be found or are meaningless.

# Interval Level of Measurement

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The **interval level of measurement** involves data that can be arranged in a meaningful order, the differences are meaningful, but ratios are meaningless.

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**Interval Level of Data**

The **interval level of measurement** involves data that can be arranged in a meaningful order, the differences are meaningful, but ratios are meaningless.

*Note*: With interval level of measurement, there is no natural zero starting point and negative values can exist.

# Ratio Level of Measurement

## Ratio Level of Data

The **ratio level of measurement** involves data that can be arranged in a meaningful order, the differences are meaningful, but there is a natural zero starting point and ratios are meaningful.

# Example 3

Classify each by level of measurement.

(a) College football ranks.

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup.

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup. Ratio

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup. Ratio

(c) Room temperature (in degrees Celsius).

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup. Ratio

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# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup. Ratio

(c) Room temperature (in degrees Celsius). Interval

(d) Your blood type.

# Example 3

Classify each by level of measurement.

(a) College football ranks. Ordinal

(b) Amount of coffee in a cup. Ratio

(c) Room temperature (in degrees Celsius). Interval

(d) Your blood type. Nominal