MATH 166: Statistics and Probability

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19-01-2018

Statistics **is the science of collecting, organizing, presenting, analyzing, and interpreting numerical data to assist in making more effective decisions.**

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What is Meant by Statistics?

Uses of Statistics

Statistical techniques are used extensively by marketing, accounting, quality control, consumers, professional sports people, hospital administrators, educators, politicians, physicians, and many others.

Who Uses Statistics?

Descriptive Statistics: Methods of organizing, summarizing, and presenting data in an informative way.

EXAMPLE 1: A Gallup poll found that 49% of the people in a survey knew the name of the first book of the Bible. The statistic 49 describes the number out of every 100 persons who knew the answer.
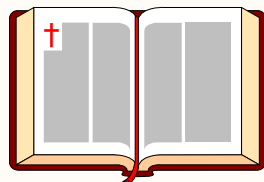
EXAMPLE 2: According to Consumer Reports, General Electric washing machine owners reported 9 problems per 100 machines during 2001. The statistic 9 describes the number of problems out of every 100 machines.
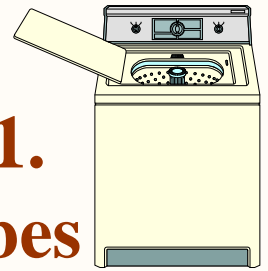
Branches of Statistics

Inferential Statistics: **A decision, estimate, prediction, or generalization about a population, based on a sample.**

A **Population** is a **Collection** of all possible individuals, objects, or measurements of interest.

A **Sample** is a portion, or part, of the population of interest

Branches of Statistics

Example 1: TV networks constantly monitor the popularity of their programs by hiring Nielsen and other organizations to sample the preferences of TV viewers.

#1

Example 2: Wine tasters sip a few drops of wine to make a decision with respect to all the wine waiting to be released for sale.

Example 3: The accounting department of a large firm will select a sample of the invoices to check for accuracy for all the invoices of the company.
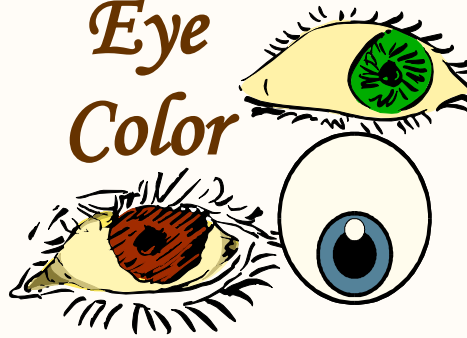
Branches of Statistics
(examples of inferential statistics)

Qualitative or **Attribute Variable** the characteristic being studied is nonnumeric.
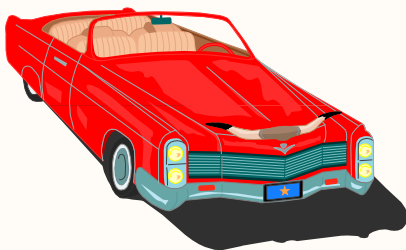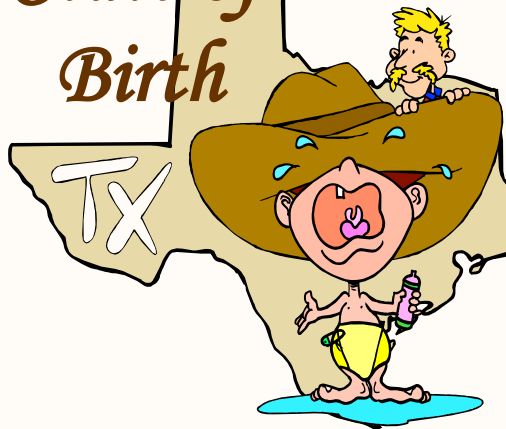
Gender

Eye Color

Religious affiliation

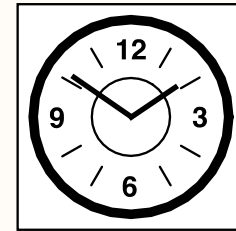*Type of car*

State of Birth

Types of Variables

In a **Quantitative Variable** information is reported numerically.

Balance in your checking account

Minutes remaining in class

Number of children in a family

Types of Variables

Quantitative variables can be classified as either **Discrete** or **Continuous**.
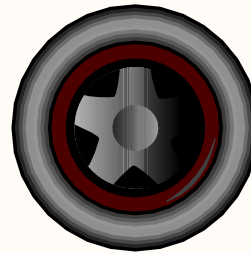
Discrete Variables: **can only assume certain values and there are usually "gaps" between values.**

Example: the number of bedrooms in a house, or the number of hammers sold at the local Home Depot (1,2,3,…,etc).
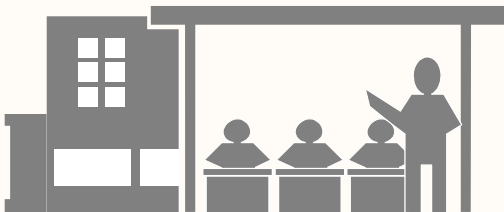
Types of Variables

A **Continuous Variable** can assume any value within a specified range.

The pressure in a tire

The weight of a pork chop

The height of students in a class.

Types of Variables

There are four levels of data

Nominal

Ordinal

Interval

Ratio

Levels of Measurement

Nominal level

Data that is classified into categories and cannot be arranged in any particular order.
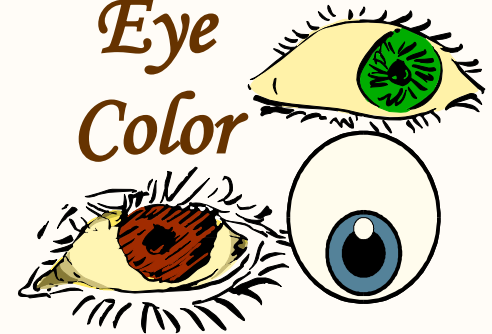
Gender

Religious affiliation

Eye Color

Nominal data

Ordinal level: involves data arranged in some order, but the differences between data values cannot be determined or are meaningless.
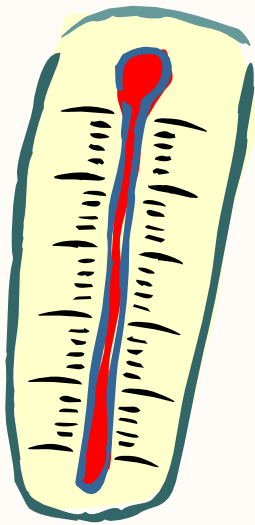
During a taste test of 4 soft drinks, Coca Cola was ranked number 1, Dr. Pepper number 2, Pepsi number 3, and Root Beer number 4.
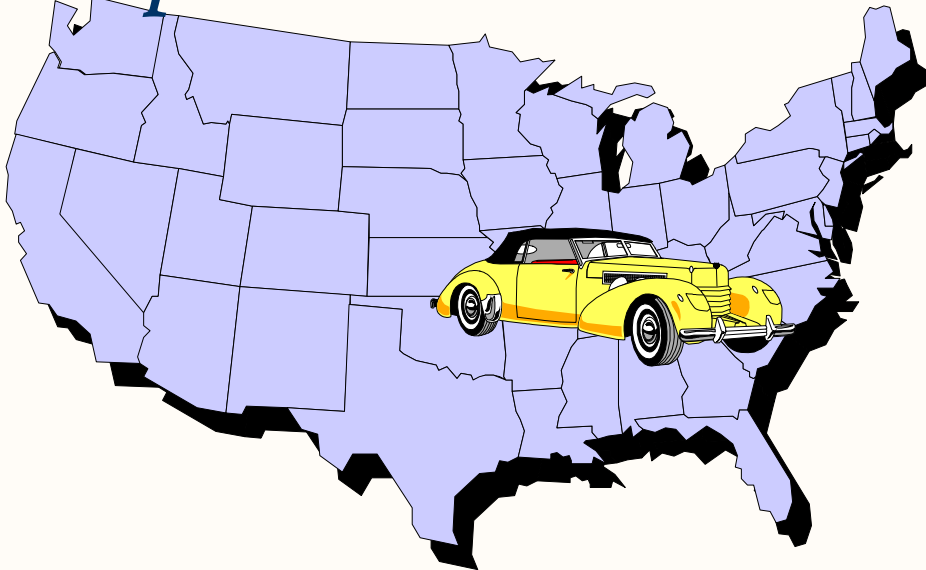
Levels of Measurement

Interval level

Similar to the ordinal level, with the additional property that meaningful amounts of differences between data values can be determined. There is no natural zero point.

Temperature on the Fahrenheit scale.

Levels of Measurement

Ratio level: the interval level with an inherent zero starting point. Differences and ratios are meaningful for this level of measurement.

Miles traveled by sales representative in a month

Monthly income of surgeons

Levels of Measurement