VOCABULARY | CHAPTER 1

Statistics:	a branch of mathematics that deals with collecting data and analyzing information to draw conclusions and help make decisions when faced with uncertainty. Statistics also provides a measure of confidence in a conclusion that is drawn.	**Example:**	1) Gathering data 2) Organizing and summarizing that data 3)Analyzing the data to find answers 4) Reporting the results in a way that shows how reliable those answers are
Data	"a fact or proposition used to draw a conclusion or make a decision."	**Example:**	numerical; height. Nonnumerical; gender.
Anecdotal	The information being conveyed is based on casual observation, not scientific research.		—---- the misuse of data typically happens when data is incorrectly obtained or analyzed.
	Population vs. Sample		
Population:	the entire group of items or individuals about which we want information; the entire set of objects or individuals to be studied	**Example:**	the set of all undergraduate students enrolled in Boston University as of Jan. 19, 2024.
Sample:	a subset of the population that is being studied.	**Example:**	part of the population of interest that we examine in order to gather information.
	Descriptive vs. Inferential Statistics		
Descriptive Statistics:	consists of organizing and summarizing data using numerical summaries (e.g. mean, IQR, standard deviation), tables, and graphs.		
Inferential Statistics:	uses information from a sample to make a conclusion about a larger group of items or individuals, e.g. the population. Inferential statistics are used to draw inferences about a population from a sample.		
	Types of Variables		

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VOCABULARY | CHAPTER 1 (cont)

Qualitative (or categorical) variable:	a characteristic or attribute that places an individual into one of several categories	**Examples:**	gender; year in college –e.g. freshman, sophomore; state in which a person was born.
Quantitative variable:	a characteristic or attribute with numerical values for which arithmetic operations provide meaningful results (or "for which arithmetic operations make sense"	**Examples:**	How the daily weather is described - temperature, relative humidity.
	Two Types of Quantitative Variables		
Discrete variable:	quantitative variable with either a finite number or countable number of possible values. Countable means the values result from counting, e. g. 0, 1, 2, 3 and so on.	**Examples:**	a household could have three children or six children, but not 4.53 children.
Continuous variable:	quantitative variable with infinite possible values which are not countable	**Examples:**	the response time of a computer could be 0.64 seconds, or it could be 0.64237123922121 seconds
	Observational Study vs. Designed Experiment		
Observational Study:	researchers simply observe individuals or question participants without trying to influence their response. Often participants are chosen randomly.		
Designed Experiment (Experimental Study)	Researchers setup an experiment and manipulate a variable and measure the effect of the manipulation on some outcome of interest. Often participants are randomly assigned to the various conditions and treatments.		
Confounding:	occurs in a study "when the effects of two or more explanatory variables are not separated."		

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VOCABULARY | CHAPTER 1 (cont)

Lurking variable:	a variable that was not considered explicitly "in a study, but that affects the value of the response variable"

Bias In Sampling

Bias is a common problem during survey sampling.

Selection bias (or Sampling bias):	occurs if the method for selecting the participants produces a sample that does not represent the population of interest.

STATS

Percentage (%)

$$\%\ \text{change} = \frac{\text{final value} - \text{initial value}}{\text{initial value}} \times 100\%$$

The minimum wage in Massachusetts was $12.00/hour as of January 1, 2019. It increased to $15.00/hour on Jan. 1, 2023.
% change = ?

$$\%\ \text{change} = \frac{\$15.00 - \$12.00}{\$12.00} \times 100\%$$

$$\%\ \text{change} = \frac{\$3.00}{\$12.00} \times 100\% = 25\%$$

The 2023 minimum wage is a 25% increase from the state's minimum wage in 2019.

!

Percentage (%)

$$\%\ \text{difference} = \frac{\text{reference value} - \text{base value}}{\text{base value}} \times 100\%$$

Harriett's annual salary: $40,000
Bob's annual salary: $52,000

Harriett filed for a divorce. A legal advisor stated: Bob's salary is 130% higher than Harriett's salary. Is the advisor's claim correct?

VOCABULARY| CHAPTER 2

Graphical Methods for Qualitative (Categorical) Variables

Qualitative (categorical) variable:	a characteristic that places an individual into one of several categories	**Examples:**	e.g. sex, nationality, political party)
Qualitative variables:		**Example:**	can be numerically described with frequencies (counts), relative frequencies (percent, proportions), cumulative frequencies, and cumulative relative frequencies.

The number of times each unique variable element is observed is called the count, or frequency (f). The relative frequency equals the frequency divided the sample size n or f/n. Relative Frequency = f/n

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