



New  
Mansoura  
University

Two dice are shown on a light-colored surface. One die is white with black pips, and the other is yellow with black pips. They are positioned diagonally, with the white die slightly behind and to the left of the yellow die. The background is a soft, out-of-focus gradient of light colors.

# Lecture 10

## Statistics



## What is statistics?

**STATISTICS** The science of collecting, organizing, presenting, analyzing, and interpreting data to assist in making more effective decisions.

Example: The inflation rate for the calendar year was 0.7%. By applying statistics we could compare this year's inflation rate to past observations of inflation. Is it higher, lower, or about the same? Is there a trend of increasing or decreasing inflation? Is there a relationship between interest rates and government bonds?



## Types of Statistics

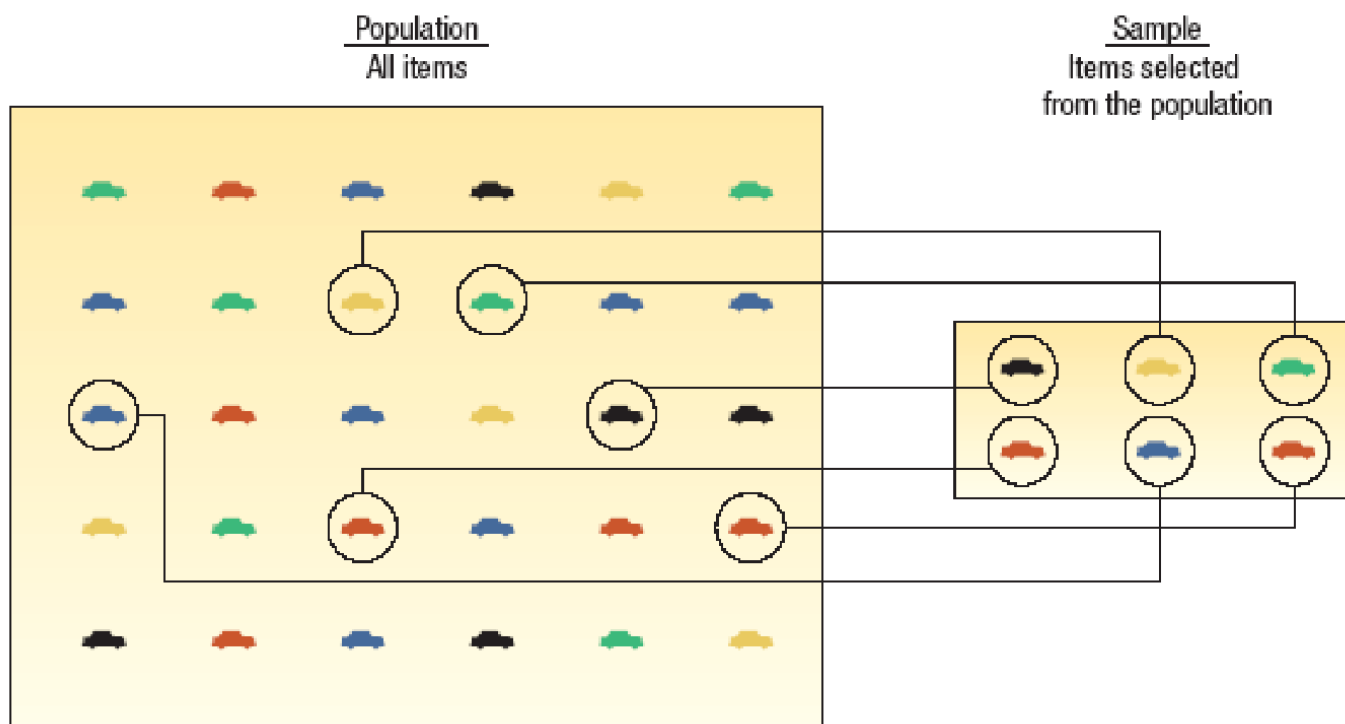
**DESCRIPTIVE STATISTICS** Methods of organizing, summarizing, and presenting data in an informative way.

**INFERENTIAL STATISTICS** The methods used to estimate a property of a population on the basis of a sample.

## Inferential statistics

**POPULATION** The entire set of individuals or objects of interest or the measurements obtained from all individuals or objects of interest.

**SAMPLE** A portion or part of the population of interest.





## Types of Variables


**QUALITATIVE VARIABLE** An object or individual is observed and recorded as a non-numeric characteristic or attribute.

Examples: gender, state of birth, eye color

**QUANTITATIVE VARIABLE** A variable that is reported numerically.

Examples: balance in your checking account, the life of a car battery, the number of people employed by a company

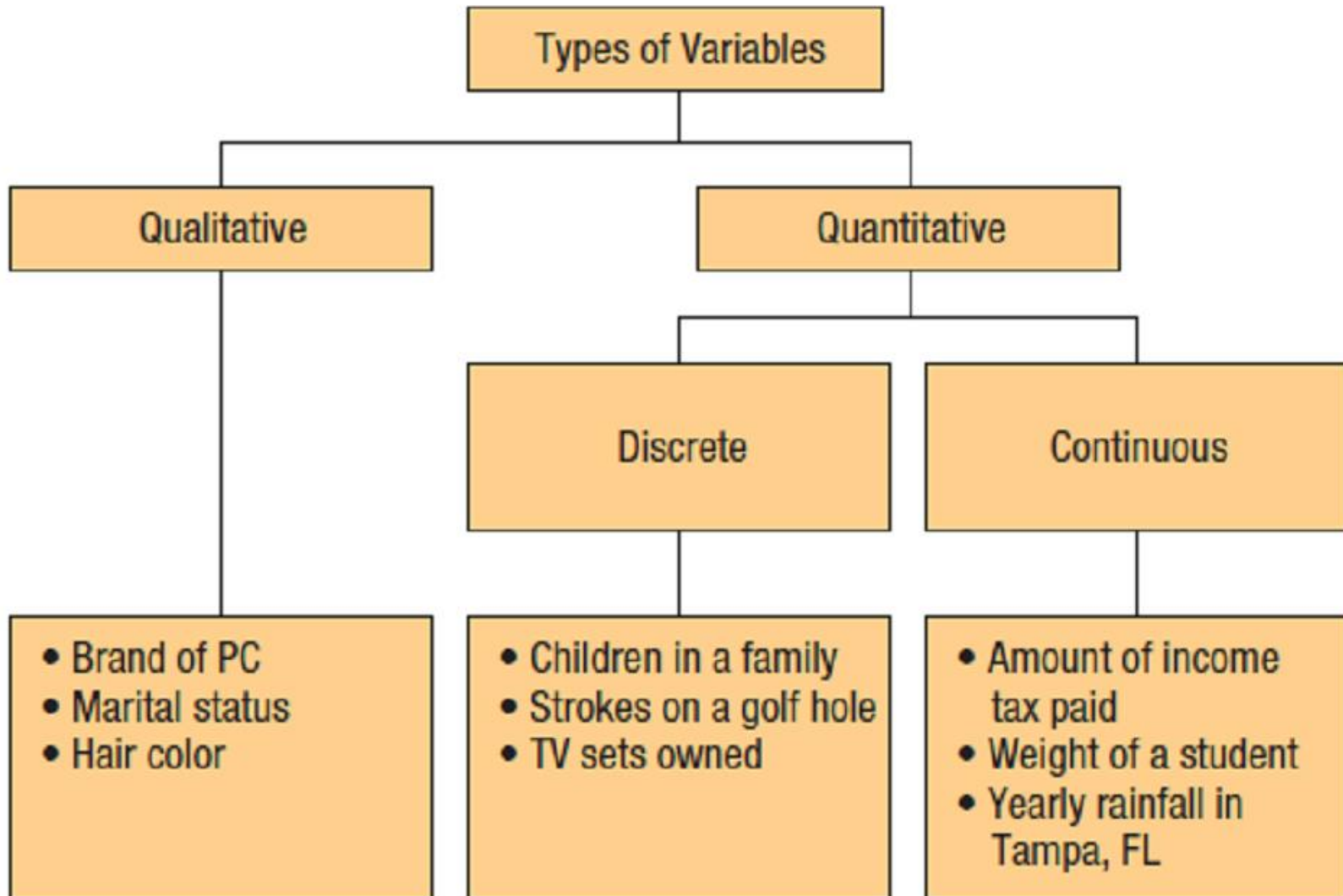
## Quantitative variables

- 
- Two yellow dice with black pips are shown in the top left corner of the slide. One die is slightly behind and to the left of the other, both showing different faces.
- ▶ Discrete variables are typically the result of counting
    - ▶ Values have “gaps” between the values
    - ▶ Examples: the number of bedrooms in a house (1, 2, 3, 4, etc.), the number of students in a statistics course (326, 421, etc.)
  - ▶ Continuous variables are usually the result of measuring something
    - ▶ Can assume any value within a specific range
    - ▶ Examples: Duration of flights from Orlando to San Diego (5.25 hours), grade point average (3.258)





# Types of Variables



## Frequency Tables

**FREQUENCY TABLE** A grouping of qualitative data into mutually exclusive and collectively exhaustive classes showing the number of observations in each class.

Location	Number of Cars
Kane	52
Olean	40
Sheffield	45
Tionesta	43
Total	<u>180</u>



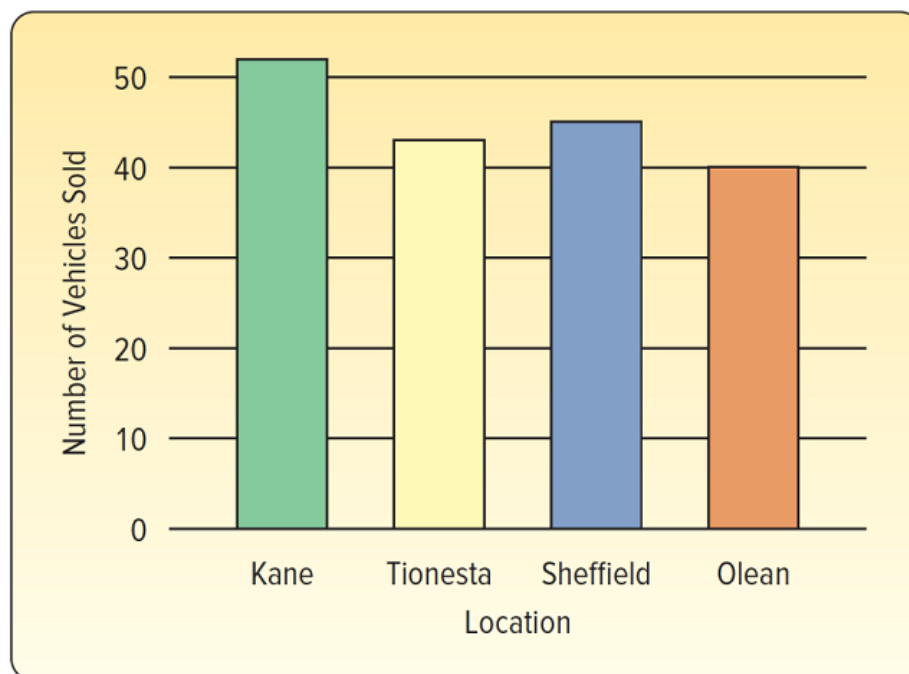


## relative frequency

Location	Number of Cars	Relative Frequency	Found by
Kane	52	.289	52/180
Olean	40	.222	40/180
Sheffield	45	.250	45/180
Tionesta	43	.239	43/180
Total	<u>180</u>	<u>1.000</u>	

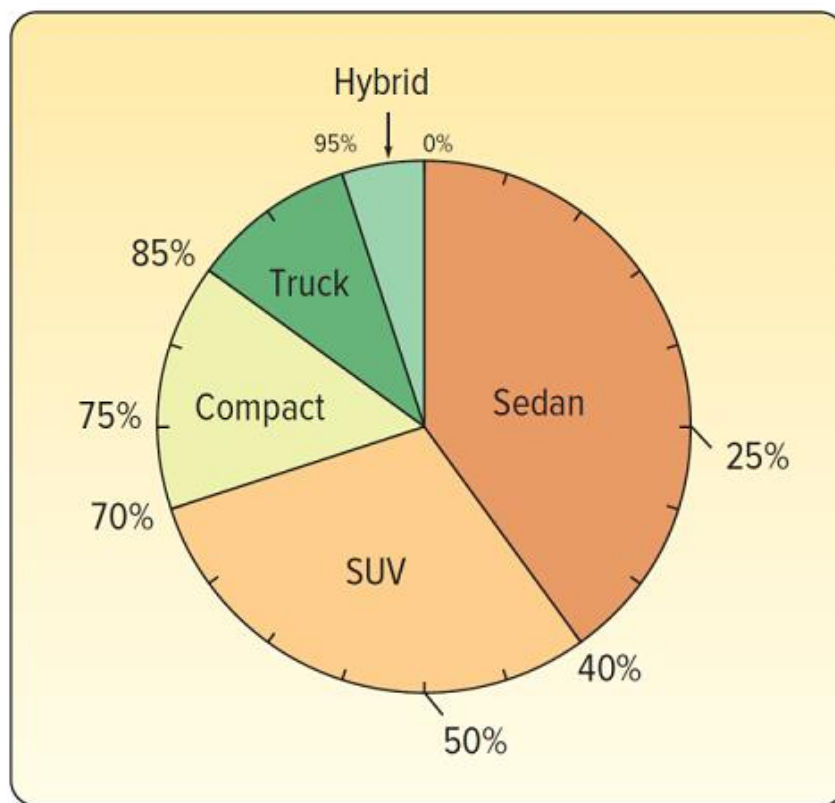
## Graphic Presentation

**BAR CHART** A graph that shows the qualitative classes on the horizontal axis and the class frequencies on the vertical axis. The class frequencies are proportional to the heights of the bars.



## Pie Chart

**PIE CHART** A chart that shows the proportion or percentage that each class represents of the total number of frequencies.





## Constructing Frequency Distributions

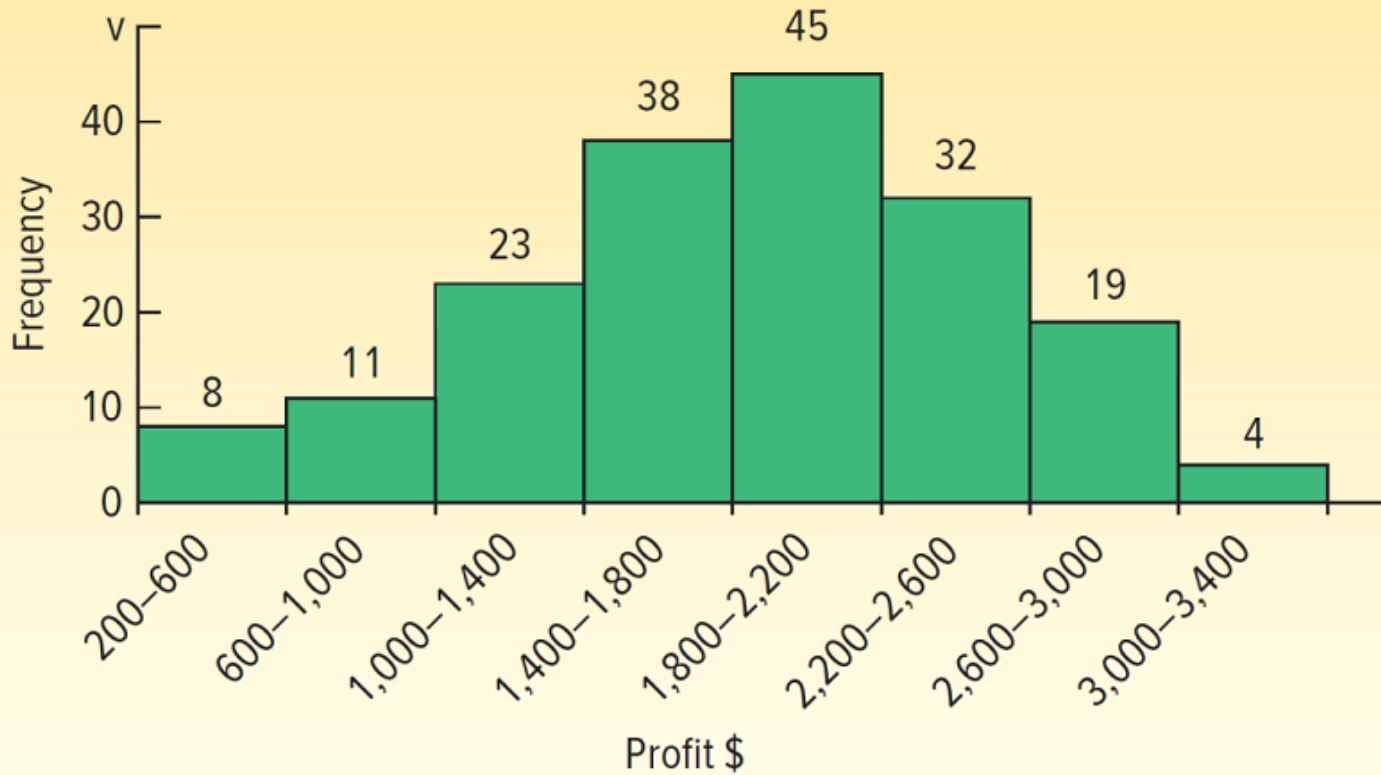
**FREQUENCY DISTRIBUTION** A grouping of quantitative data into mutually exclusive and collectively exhaustive classes showing the number of observations in each class.

- ▶ This is a four-step process
  1. Decide on the number of classes
  2. Determine the class interval
  3. Set the individual class limits
  4. Tally the data into classes and determine the number of the observations in each class

## Frequency Distributions

Profit	Frequency	Relative Frequency	Found by
\$ 200 up to \$ 600	8	.044	8/180
600 up to 1,000	11	.061	11/180
1,000 up to 1,400	23	.128	23/180
1,400 up to 1,800	38	.211	38/180
1,800 up to 2,200	45	.250	45/180
2,200 up to 2,600	32	.178	32/180
2,600 up to 3,000	19	.106	19/180
3,000 up to 3,400	4	.022	4/180
Total	180	1.000	

# HISTOGRAM







# Cumulative Frequency

Profit	Cumulative Frequency	Found by
Less than \$ 600	8	8
Less than 1,000	19	$8 + 11$
Less than 1,400	42	$8 + 11 + 23$
Less than 1,800	80	$8 + 11 + 23 + 38$
Less than 2,200	125	$8 + 11 + 23 + 38 + 45$
Less than 2,600	157	$8 + 11 + 23 + 38 + 45 + 32$
Less than 3,000	176	$8 + 11 + 23 + 38 + 45 + 32 + 19$
Less than 3,400	180	$8 + 11 + 23 + 38 + 45 + 32 + 19 + 4$



# Example

Wachesaw Manufacturing Inc. produced the following number of units in the last 16 days.

27	27	27	28	27	25	25	28
26	28	26	28	31	30	26	26

The information is to be organized into a frequency distribution.

1. Construct the Frequency distribution Table
2. Draw the histogram



# Thank You