Descriptive Statistics

Graphing and Summarizing Data

Descriptive Statistics Outline/learning Objectives

- To interpret and produce an effective graphical summary of a data set.
- To identify various types of numerical variables.
- To interpret and produce numerical summaries of data including percentiles and five-number summaries.
- To describe the spread of a data set using range, interquartile range, and standard deviation.

14.1 Graphical Descriptions of Data

- **Data set**
  A collection of data values denoted by *N*.
- **Data points**
  Individual data values in a data set.

14.1 Graphical Descriptions of Data

Stat 101 Test Scores: Part 1

Professor Blackbeard has posted the results in the hallway outside his office. The data set consists of N = 75 data points (the number of students that took the test). Each data point is a raw score on the midterm between 0 and 25.

12, 16, 11, 24, 9, 10, 14, 8, 12, 12, 11, 10, 11, 10, 1, 10, 11, 9, 13, 10, 10, 13, 15, 11, 9, 14, 10, 12, 12, 10, 8, 7, 11, 11, 14, 6, 11, 13, 10, 9, 11, 10, 9, 9, 12, 11, 13, 11, 8, 9, 9, 12, 13, 13, 12, 10, 10, 14, 14, 12, 13, 9, 11, 13, 8, 8, 10, 7, 10, 9, 10, 8, 15, 11, 10

14.1 Graphical Descriptions of Data

- Each student has one question on their mind: **How did I do?**
- It's the next question that is statistically more interesting to Professor Blackbeard:
- **How did the class as a whole do?**

14.1 Graphical Descriptions of Data

Stat 101 Test Scores: Part 2

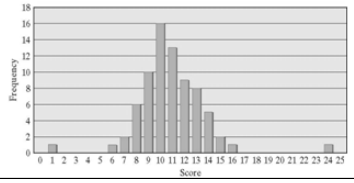
The first step in summarizing the information is to organize the scores in a **frequency table**. In this table, the number below each score gives the **frequency** of the score– that is, the number of students getting that particular score.

Score	1	6	7	8	9	10	11	12	13	14	15	16	24
Frequency	1	1	2	6	10	16	13	9	8	5	2	1	1

14.1 Graphical Descriptions of Data

Stat 101 Test Scores: Part 2

The figure below shows the information in a more visual way called a **bar graph**. With a bar graph, it is easy to detect **outliers** -- extreme data points that do not fit into the overall pattern of the data (the score of 1 and 24).



14.1 Graphical Descriptions of Data

Stat 101 Test Scores: Part 2

A histogram will show frequency of numerical values while a bar graph does not have to show this. A histogram is connected

Graphical Descriptions of Data

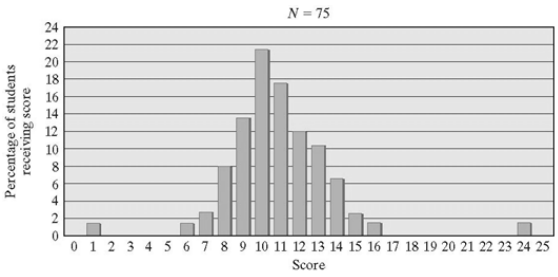
Stat 101 Test Scores: Part 2

Sometimes it is more convenient to express the bar graph in a term of *relative frequencies*– that is, the frequencies given in terms of percentages of the total population.

Score	1	6	7	8	9	10	11	12	13	14	15	16	24
Freq.	1	1	2	6	10	16	13	9	8	5	2	1	1
Rel. Freq. (in %)	1.3	1.3	2.7	8	13.3	21.4	17.3	12	10.7	6.7	2.7	1.3	1.3

Graphical Descriptions of Data

The change from actual frequencies to percentages (or vice versa) does not change the shape of the graph.



Graphical Descriptions of Data

Practice Work. Directions are on the next slide.

Example 1: Researchers want to determine the age at which adolescent males show the greatest rate of physical growth. The age of maximum yearly growth for each is as follows:

12, 14, 13, 14, 16, 14, 14, 17, 13, 10, 13, 18, 12, 15, 14, 15, 15, 14, 14, 13, 15, 16, 15, 12, 13, 16, 11, 15, 12, 13, 12, 11, 13, 14, 14