

Graphical and Tabular Methods in Descriptive Statistics



MATH 3342
Section 1.2



Descriptive Statistics

- Graphs and Tables
- Numerical Summaries
 - Sections 1.3 and 1.4



Why graph data?

- The amount of data collected is overwhelming.
- How do we make sense of all of this information?
 - Graphs can organize and display data in helpful ways.
 - We can summarize key features of the data.



Common Visual Methods

- Frequency Tables
- Tally Sheets
- Histograms
- Stem-and-Leaf Plots
- Dot Plots
- Pie Charts
- Scatter Plots




Two Types of Variables

- _____
 - Takes numeric values for which arithmetic operations make sense.
 - Usually recorded in a unit of measurement.
- _____
 - Places an individual into one of several groups, classifications, or categories.



_____ Variables

- Discrete:
 - Set of possible values is either finite **OR** can be listed in an infinite sequence.
- Continuous:
 - The possible values consist of an entire interval on the number line.



Distribution of a Variable

- Distributions tell us what values variables take and how often they take these values.
- _____:
 - Tells what values the variable takes and how often it takes these values.
- _____:
 - Lists the categories and gives either the count or the proportion of individuals in each.



Frequency Tables

- Standard frequency tables have three columns:
 - Categories or bins for the variable
 - Frequency
 - Relative frequency



Frequency Tables

■ Frequency:

- The number of times a variable takes a value or falls within a range of values

■ Relative Frequency:

$$\text{relative frequency} = \frac{\text{frequency}}{\text{total number of observations}}$$



Histograms for _____ Data

■ The length **and** the width of the bars have specific meanings.

- Length is proportional to count.
- Width determined by data ranges.

■ The bars touch, indicating that all values of the variable are covered.

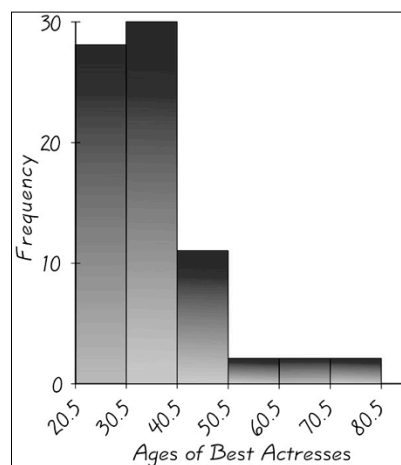
How to Make a Histogram

1. Divide the range of data into classes of **equal** width.
2. Count the number of individuals in each class.
3. Draw a bar for each class corresponding to the count.

Example

Table 2-2
Frequency Distribution:
Ages of Best Actresses

Age of Actress	Frequency
21–30	28
31–40	30
41–50	12
51–60	2
61–70	2
71–80	2



Histograms for _____ Data

- Consists of bars representing counts or percentages for particular **categories**.
- The heights of the bars are proportional to the counts or percentages.
 - Widths have **no** meaning!
- The bars do **not** touch.
 - This denotes the separation between categories.

SUV Example

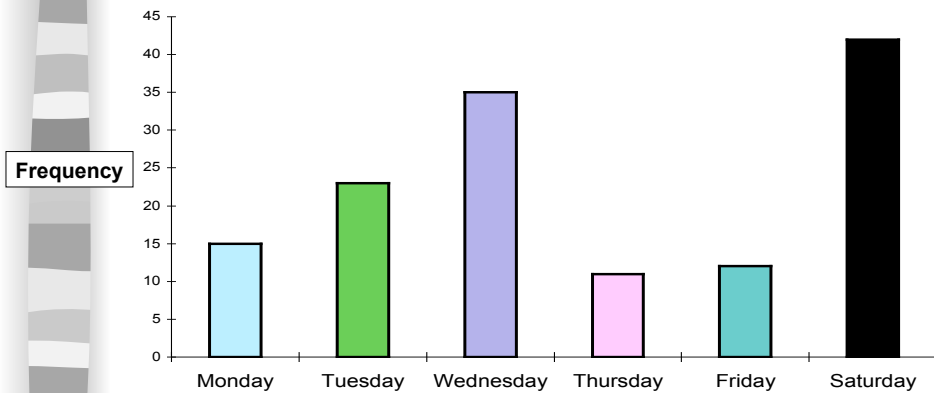
- The table below lists the number of SUVs sold last week (by day) for a local dealership.



Day	Number Sold
Monday	15
Tuesday	23
Wednesday	35
Thursday	11
Friday	12
Saturday	42

SUV Example

SUVs Sold Last Week



Stem-and-Leaf Plots

- Much like a histogram turned sideways.
- Instead of bars, we list the individual values.
- Typically used for quick analysis and/or for small data sets.

Making a Stem-and-Leaf Plot

1. Sort the data in increasing order.
2. Separate each observation into the **stem** and **leaf**.
3. Write stems in a column in increasing order.
4. Draw a vertical line to the right of the stems.
5. Place each leaf to the right of its stem, in increasing order out from the stem.
6. Somewhere indicate units for stems and leaves.

Example

1	59
2	0123455667778
3	002222333344566777889
4	0002335999
5	035
6	1

Standard

1	59
2	01234
2	55667778
3	002222333344
3	566777889
4	000233
4	5999
5	03
5	5
6	1

Split

Dot Plots

- Very similar to histograms.
- Each individual data value is represented with a dot.
- Typically used for smaller data sets.

Example

Table 2-1 Academy Awards: Ages of Best Actresses and Best Actors

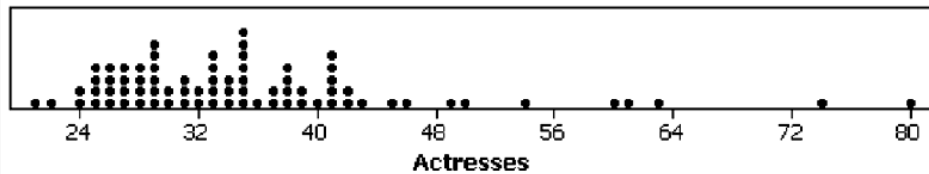
The ages (in years) are listed in order, beginning with the first awards ceremony.

Best Actresses

22	37	28	63	32	26	31	27	27	28
30	26	29	24	38	25	29	41	30	35
35	33	29	38	54	24	25	46	41	28
40	39	29	27	31	38	29	25	35	60
43	35	34	34	27	37	42	41	36	32
41	33	31	74	33	50	38	61	21	41
26	80	42	29	33	35	45	49	39	34
26	25	33	35	35	28				

Example

Dotplot of Ages of Actresses



What to Look For

- Look for the **overall pattern** and for any striking **deviations** from that pattern.
- Describe the overall pattern by its **shape**, **center**, and **spread**.
- Gaps in the distribution.
- _____:
 - Important kind of deviation
 - Individual values that fall outside the overall pattern.



Shape

- Modality
- Symmetry or Skewness



Modality

- Unimodal
 - Has one peak
- Bimodal
 - Has two peaks
- Multimodal
 - Has more than two peaks

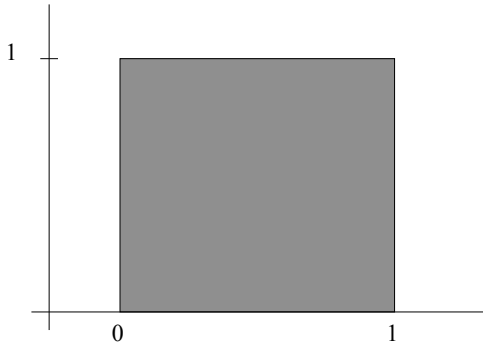
A Unimodal Distribution



A Bimodal Distribution



How many modes?



Symmetry and Skewness

- Symmetric Distributions
 - The left and right sides of the distribution are approximately mirror images.
- Positively Skewed
 - **Right** tail extends much further out than the left.
- Negatively Skewed
 - **Left** tail extends much further out than the right.