4.2 Shapes of Distributions

- Symmetry
  - Symmetrical or asymmetrical
  - If symmetrical, mounded or flat?
- Skew
  - Right, left
- Peaks or Modes
  - Unimodal, bimodal, multiple peaks
- Spread
  - Narrow spread or wide spread

A distribution is symmetric if its left half is a mirror image of its right half.

Flat or Uniform

Perfectly flat
Flat or Uniform
Not perfectly flat, but close. We want to describe the general shape of the distribution.

Not symmetrical

A distribution that is not symmetric must have values that tend to be more spread out on one side than on the other. In this case, we say that the distribution is skewed.

Figure 4.7 (a) Skewed to the left (left-skewed): The mean and median are less than the mode. (b) Skewed to the right (right-skewed): The mean and median are greater than the mode. (c) Symmetric distribution: The mean, median, and mode are the same.
Stat 1010: Shapes of distributions

Right-skewed

- pH of Pork Loins

- Salary

Left-skewed

- Flexibility Index of Young Adult Men
Right-skewed or Left-skewed

- A distribution is **left-skewed** if its values are more spread out on the left side.
- A distribution is **right-skewed** if its values are more spread out on the right side.

Number of Modes

- If there are numerous obvious peaks, we say there are multiple modes.
  - One peak → unimodal
  - Two peaks → bimodal
  - More than two peaks → multiple modes
- Some peaks can be ‘major’ peaks and some can be ‘minor’ peaks

Multiple Peaks

![Histogram with major and minor peaks](image_url)
Measures of Center

- These help describe a distribution, too.
- A typical or representative value.
- Mean, Median, Mode
- Summary of the whole batch of numbers.
- For symmetric distributions – easy.
Variation matters.
- Tightly clustered?
- Spread out?
- Low and high values?

Variation describes how widely data are spread out about the center of a data set.

Comparing Distributions
- How do the distributions compare in terms of...
  - Shape?
  - Center?
  - Spread?
Workout Times: Men

Workout Times: Women

Women
To describe a distribution, use…

- Shape
- Center
- Spread