

1. Variability of data.

- (a) $Q3 = 13.8$
- (b) $IQR = Q3 - Q1 = 13.8 - 10.1 = 3.7$

2. Experimental design.

- (a) One or both of the following must be stated.
 - (i) Every participant receives some “treatment.”
 - (ii) Create a “control” condition.
- (b) Participants in the placebo condition revealed improvements.
- (c) Someone other than the researcher must carry out the experiment and collect data.

3. Types of variables.

- (a) Quantitative / continuous
- (b) Quantitative / discrete
- (c) Categorical
- (d) Quantitative / discrete

4. Bias in scientific studies.

An example of a study in which participants’ responses are influenced by the how they are obtained.

5. Numerical and graphical summary of data.

Note: $\sum x = 6.5$; $\sum x^2 = 6.87$; $n = 7$

(a) $\bar{x} = \frac{\sum x}{n} = \frac{6.5}{7} = 0.929$

$$s = +\sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}} = +\sqrt{\frac{6.87 - (6.5)^2/7}{7-1}} = 0.373$$

(b)

Stem	Leaf
0	4
0	689
1	12
1	5

The distribution of the data is skewed to the right.

6. Standardized score.

$$(a) z_1 = \frac{x_1 - \bar{x}_1}{s_1} = \frac{5500 - 3000}{500} = 5.00$$

\Rightarrow No, Fred's price is more than 3 standard deviations above the mean.

$$(b) z_2 = \frac{x_2 - \bar{x}_2}{s_2} = \frac{7000 - 4500}{1000} = 2.50$$

\Rightarrow Yes, George's price is only 2.5 standard deviations above the mean.

7. Margin of error.

$$(a) \frac{240}{450} \times 100 = 53.3$$

$$\frac{1}{\sqrt{n}} \times 100 = \frac{1}{\sqrt{450}} \times 100 = 4.7$$

(b) No, the true percentage can be as low as $53.3 - 4.7 = 48.6$.

$$(c) \frac{1}{\sqrt{1600}} \times 100 = 2.5 \Rightarrow n = 1600$$