

1. Types of variables.

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

2. The z -score.

$$(a) z = \frac{x - \bar{x}}{s} = \frac{3400 - 3000}{250} = 1.600 \text{ (Fred)}$$

$$z = \frac{x - \bar{x}}{s} = \frac{2800 - 2500}{180} = 1.667 \text{ (George)}$$

Thus, George got the better deal.

$$(b) z = \frac{x - \bar{x}}{s} = \frac{5000 - 3000}{250} = 8.000 \text{ (Henry)}$$

No, it is extremely unlikely that Henry sold his car for \$5,000.

3. Bias in scientific studies.

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

4. Numerical summary of data.

$$\text{Note: } \sum x = 5.48; \sum x^2 = 4.498; n = 7$$

$$(a) m = 0.76$$

$$(b) \bar{x} = \frac{\sum x}{n} = \frac{5.48}{7} = 0.783$$

$$s = +\sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}} = +\sqrt{\frac{4.498 - (5.48)^2/7}{7-1}} = 0.186$$

(c) The distribution of the data is skewed to the right (mean > median).

5. Graphical summary of data.

Stem	Leaf
5	1
6	4
7	26
8	3
9	7
10	5

The stem width is 0.1. The smallest value is presented by: $5 \times \underline{0.1} + 0.01 = 0.51$

6. Variability of data.

(a) $\text{IQR} = Q3 - Q1 = 21.3 - 19.2 = 2.1$

(b) $19.2 - 1.5(2.1) = 16.05$ (lower fence)

$21.3 + 1.5(2.1) = 24.45$ (upper fence)

Thus, "25" is a potential outlier.

7. Experimental design.

(a) $n = 500 \times .43 = 215$

$$\frac{1}{\sqrt{n}} \times 100 = \frac{1}{\sqrt{215}} \times 100 = 6.8$$

(b) "Age" is the extraneous variable. To remove the influence of age, only a certain age group (40 to 50) is selected.

(c) Non-response bias.