

Introductory Statistics Tutorial Answers

Chapter 3 – Exploratory Tools for Relationships

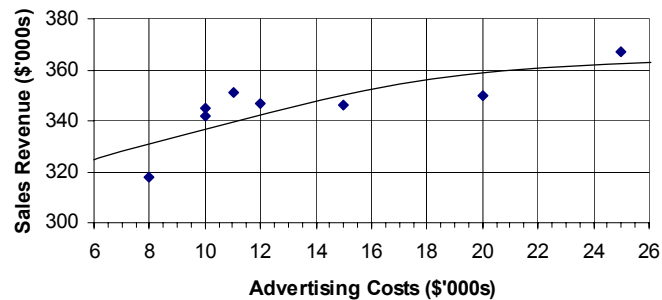
Section A: Types of Variables

1. (a) Quantitative variables are measurements and counts.
- (b) Qualitative variables describe group membership.
2. (a) To explore the relationship between two quantitative variables we use a scatter plot.
- (b) To explore relationships between a qualitative variable and a quantitative variable we use dot plots, stem-and-leaf plots and box plots.
- (c) To explore the relationship between two qualitative variables we use a two-way table of counts.

Section B: Two Variables

1. (1)
2. (3)
3. (5)
- 4.

Sales Revenue versus Advertising Costs

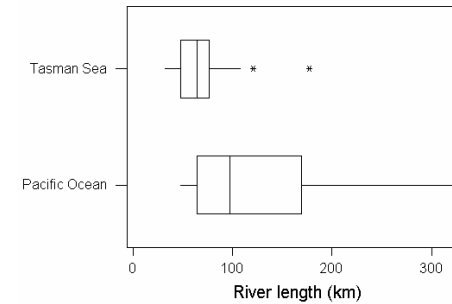


Interpretation:

As advertising costs increase, sales revenue also increases.
 The relationship is not linear – the increase in sales revenue decreases as advertising costs increase.
 There are no outliers in this data.
 The amount of scatter about the trend curve is small.

5. (a)

Lengths of Major Rivers in the South Island



Note: For the rivers flowing into the Pacific Ocean:

$$\text{IQR} = 105, 1.5 \times \text{IQR} = 157.5, Q_3 + 1.5 \times \text{IQR} = 326.5, Q_1 - 1.5 \times \text{IQR} = -93.5$$

There are no outside values, the whiskers end at 48 (lower) and 322 (upper).

For the rivers flowing into the Tasman Sea:

$$\text{IQR} = 28, 1.5 \times \text{IQR} = 42, Q_3 + 1.5 \times \text{IQR} = 118, Q_1 - 1.5 \times \text{IQR} = 6$$

177 and 121 are outside values, the whiskers end at 32 (lower) and 108 (upper).

(b) On average, the rivers flowing into the Pacific Ocean are longer.

The lengths of the rivers flowing into the Pacific Ocean have a larger spread than the lengths of the rivers flowing into the Tasman Sea.

The lengths of the rivers flowing into the Pacific Ocean are skewed to the right (positively skewed).

The Grey River and Buller River are outliers amongst the rivers flowing into the Tasman Sea.