# **Solutions Manual**

## to accompany

## Australasian Business Statistics 3<sup>rd</sup> Edition

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## **Chapter 1 - Introduction to Statistics**

### SOLUTIONS TO PROBLEMS IN CHAPTER 1

1.1 Examples of data in functional areas:

*accounting* — cost of goods, salary expense, depreciation, utility costs, taxes, equipment inventory, etc.

*finance* — Bond rates, number of failed savings and loans, measured risk of common stocks, stock dividends, foreign exchange rate, liquidity rates for a single-family, etc.

*human resources* — salaries, number of engineering staff, years experience, age of employees, years of education, etc.

*marketing* — number of units sold, dollar sales volume, forecast sales, size of sales force, market share, measurement of consumer motivation, measurement of consumer frustration, measurement of brand preference, attitude measurement, measurement of consumer risk, etc.

*information systems* — processing. time, size of memory, number of work stations, storage capacity, percent of professionals who are connected to a computer network, dollar assets of company computing, number of 'hits' on the Internet, time spent on the Internet per day, percentage of people who use the Internet, retail dollars spent via e-commerce, etc.

*production* — number of production runs per day, weight of a product; assembly time, number of defects per run, temperature in the plant, amount of inventory, turnaround time, etc.

*management* — measurement of union participation, measurement of employer support, measurement of tendency to control, number of subordinates reporting to a manager, measurement of leadership style, etc.

#### 1.2 Examples of data in business industries:

*manufacturing* — size of punched hole, number of rejects, amount of inventory, amount of production, number of production workers, etc.

*insurance* — number of claims per month, average amount of life insurance per family head, life expectancy, cost of repairs for major auto collision, average medical costs incurred for a single female over 45 years of age, etc.

*travel* — cost of airfare, number of kilometres travelled for ground-transported holidays, number of nights away from home, size of travelling party, amount spent per day on incidentals, etc.

*retailing* — inventory turnover ratio, sales volume, size of sales force, number of competitors within 2 kilometres of retail outlet, area of store, number of sales people, etc.

*communications* — cost per minute, number of phones per office, kilometres of cable per customer headquarters, minutes per day of long distance usage, number of operators, time between calls, etc.

*computing* — age of hardware, cost of software, number of CAD/CAM stations, age of computer operators, measure to evaluate competing software packages, size of database, etc.

*agriculture* — number of farms per State, farm income, number of hectares of wheat per farm, wholesale price of a litre of milk, number of livestock, grain storage capacity, etc.

*banking* — size of deposit, amount loaned, number of tellers per retail outlet, average amount of withdrawal from automatic teller machine, discount rate, etc.

*healthcare* — number of patients per doctor per day, average cost of hospital stay, average daily census of hospital, time spent waiting to see a doctor, patient satisfaction, number of blood tests done per week.

- 1.3 *Descriptive statistics* in recorded music industry:
  - (1) ARIA total sales of CDs this week, number of artists under contract to a record company at a given time.
  - (2) total dollars spent on advertising last month to promote an album.
  - (3) number of units produced in a day.
  - (4) number of retail outlets selling the company's products.

Inferential statistics in recorded music industry:

- (1) measurement of the amount spent per month on recorded music for a few consumers then use that figure to infer the amount spent for the population.
- (2) determination of market share for rap music by randomly selecting a sample of 500 purchasers of recorded music.
- (3) determination of top ten single records by sampling the number of requests at a few radio stations.
- (4) estimation of the average length of a single recording by taking a sample of records and measuring them.

The difference between descriptive and inferential statistics lies mainly in the coverage of the data. These descriptive examples all gather data from every item in the population about which the description is being made. For example, Sony BMG measures the sales on *all* its compact discs for a week and reports the total.

In each of the inferential statistics examples, a *sample* of the population is taken and the population value is estimated or inferred from the sample. For example, it may be practically impossible to determine the proportion of buyers who prefer rap music. However, a random sample of buyers can be contacted and interviewed for music preference. Polpulation market share can be inferred from the results. The results can be inferred to population market share.

### 1.4 *Descriptive statistics*:

- (1) total number of worker hours per plant per week helps management understand labour costs, work allocation, productivity, etc.
- (2) company sales volume of batteries in a year helps management decide if the product is profitable, how much to advertise in coming year, compare to costs to determine profitability.
- (3) total amount of sulfuric acid purchased per month for use in battery production can be used by management to study wasted inventory, scrap, etc.

### Inferential Statistics:

- take a sample of batteries and test them to determine the average shelf-life

   use the sample average to reach conclusions about all batteries of this type. Management can then make labelling and advertising claims. They can compare these figures to the shelf-life of competing batteries.
- (2) Take a sample of battery consumers and determine how many batteries they purchase per year. Make inference for the entire population management can use this information to estimate market potential and penetration.
- (3) Interview a random sample of production workers to determine attitude towards company management management can use the survey results to ascertain employee morale and to direct efforts towards creating a more positive working environment which, hopefully, results in greater productivity.
- 1.5 (a) continuous
  - (b) continuous
  - (c) ordinal
  - (d) nominal
  - (e) continuous
  - (f) continuous (in fact discrete, but usually treated as continuous for analysis)
  - (g) nominal
  - (h) continuous
- 1.6 (a) ordinal
  - (b) discrete, but treated as continuous for analysis
  - (c) nominal
  - (d) continuous
  - (e) discrete, but treated as continuous for analysis
  - (f) ordinal
  - (g) discrete, but treated as continuous for analysis
  - (h) nominal
  - (i) ordinal

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- 1.7 (a) The population for this study is the 900 clients of Powerkontrol Australia.
  - (b) The sample is the randomly chosen group of 35 clients.
  - (c) The statistic is the average satisfaction score for the sample of 35 clients.
  - (d) The parameter is the average satisfaction score for all 900 clients of Powerkontrol Australia in the population.
- 1.8 (a) The variables affecting a person's interest in cricket test matches include: playing teams, significance of test match, ticket price, etc.
  - (b) What is your age?

What is your gender?

What is your employment status: fulltime, part-time, unemployed, student? On how many days in the last 12 months did you attend test cricket matches?

On how many days do you plan to attend test matches in the next 12 months?

What do you consider to be a reasonable price for a ticket?

How much are you willing to spend on food and beverages at the stadium? What kind of additional entertainment would you like to see in future test matches?

How would you travel to the match? Tick all that apply: car, bus, train, other.

Did you experience any transport problems in the past when attending test matches? If so, please specify.

Is there anything in particular that would attract you to future test matches?