Foundations of Statistical Measurement

Important Terms in Research

- **Measurement** is the process of assigning numbers or categories to a specific characteristic based on explicit rules.
- The specific decisions made during measurement determine the type of data produced for analysis.
    - A single characteristic can result in different data types depending on the measurement rules chosen.
- A **variable** is any characteristic that takes on different values across individuals or observations.
    - Variables must vary within a dataset to be analysed statistically.
    - **Anxiety levels** can be recorded as numerical scores, while **handedness** is recorded as categories.
- A **population** consists of the entire group of individuals or events a study intends to describe.
    - Populations are usually conceptual because they are rarely feasible to measure in full.
- A **sample** is a smaller subset of individuals selected from the population for actual measurement.
    - Statistical analysis is performed on sample data rather than the entire population.
    - Conclusions about the broader population are drawn based on the results found in the sample.
- A **parameter** is a numerical value that describes a characteristic of a population.
    - Parameters are generally unknown because populations are not fully measured.
- A **statistic** is a numerical value that describes a characteristic of a sample.
    - Statistics are calculated directly from observed data to help organise and interpret it.
    - **Descriptive statistics** are used to summarise data, while **inferential statistics** use sample data to make claims about a population.

Variables and Data Types

- **Discrete variables** consist of a limited set of possible values and are often called categorical data.
    - Each observation in a discrete variable belongs to only one category.
    - Examples include handedness (left, right, ambidextrous) or grouped **anxiety categories** (low, average, high).
- **Continuous variables** consist of many possible numerical values along a scale and are called measurement data.
    - The differences between values in continuous variables represent meaningful quantitative differences.
    - Common examples include **height, weight, age**, and **questionnaire total scores.**
- **Numerical data** can be changed into discrete data through categorisation.

Practice Exam Questions

1. A variable must satisfy which condition to be analysed statistically?

a. It must be measured using a ratio scale
b. It must vary across individuals or observations
c. It must be numerical rather than categorical
d. It must be normally distributed

2. Which example represents a population rather than a sample?

a. The 40 participants who completed a laboratory experiment
b. All patients attending a clinic during one afternoon
c. All adults living in Australia in 2025
d. The first 100 survey responses collected online

3. A parameter differs from a statistic because a parameter

a. is calculated directly from observed data
b. summarises a sample characteristic
c. is usually larger in value
d. describes a population characteristic

4. Which statement correctly distinguishes descriptive from inferential statistics?

a. Descriptive statistics test hypotheses, inferential statistics do not
b. Inferential statistics summarise data, descriptive statistics do not
c. Descriptive statistics summarise data, inferential statistics generalise to a population
d. Both are used only when populations are fully measured

5. Handedness recorded as left, right, or ambidextrous is an example of

a. continuous measurement data
b. discrete categorical data
c. ratio-level data
d. interval-level data

6. A continuous variable is characterised by

a. mutually exclusive categories
b. an absence of numerical meaning
c. ordered ranks without equal spacing
d. many possible values along a numerical scale