Topic 4

Descriptive Statistics

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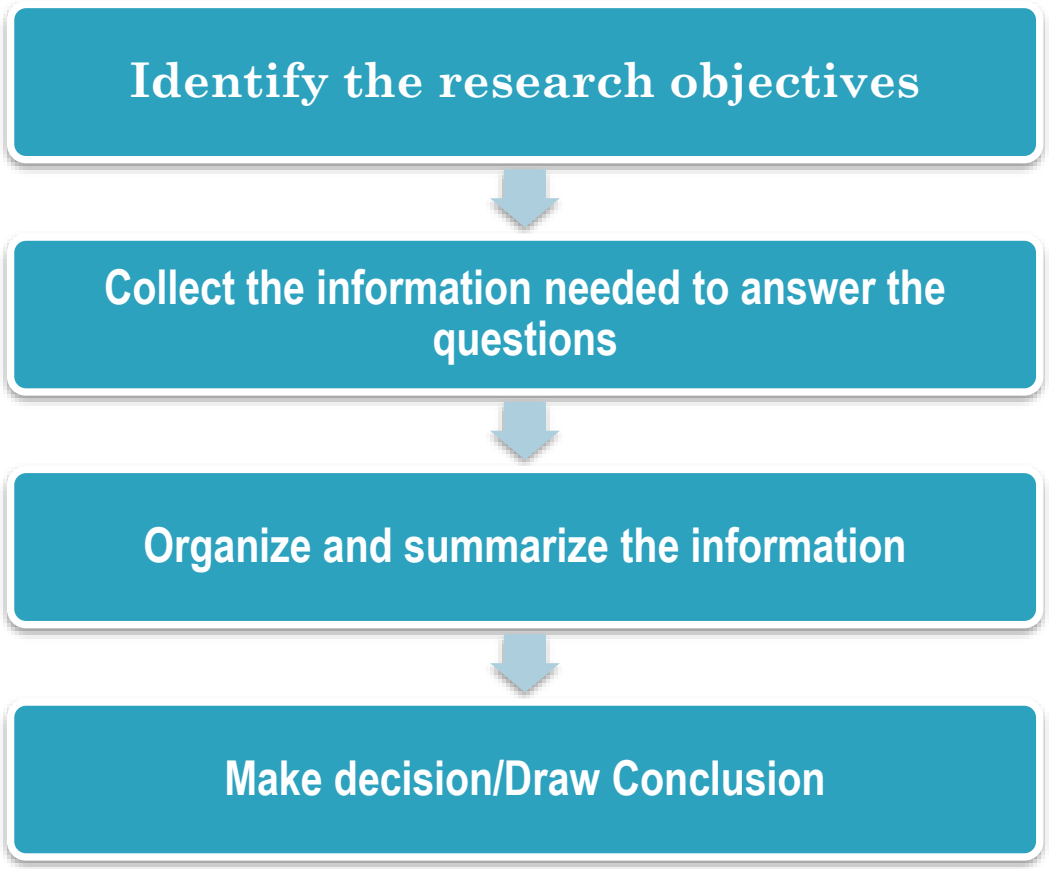
4.1.1 What is Statistics?

Definition

Statistics is a branch of mathematics that is concerned with **collecting, organizing, summarizing and analyzing information** in order to draw conclusions and make decisions

4.1.1 What is Statistics?

THE PROCESS OF STATISTICS



4.1.2 Types of Statistics

Descriptive statistics

- is a field of study which involves organizing, displaying and describing data by using tables, graphs (graphical techniques) and summary measures (numerical techniques).

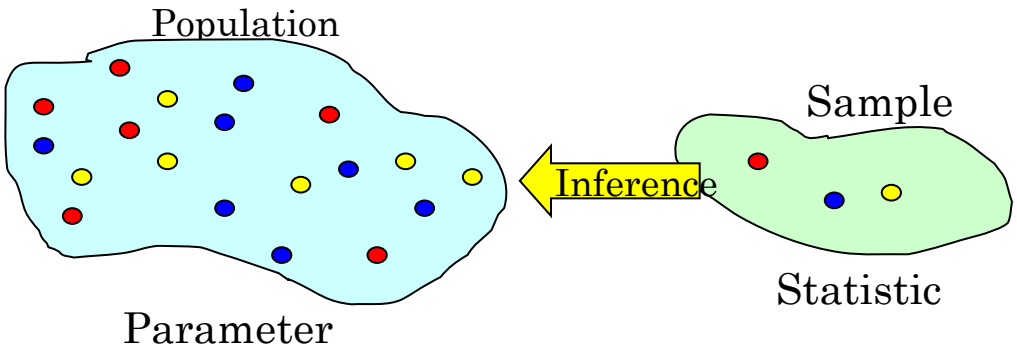
Inferential Statistics

- is a field of study that used sample results to make decisions about population.

4.1.2 Types of Statistics

Statistical Inference

is the ***process*** of making an estimate, prediction, or decision about a population based on a sample.



4.1.2 Types of Statistics

Statistical Inference

We use a statistic to make an inference about a parameter

Rationale

- Large populations make investigating each member impractical and expensive
- Easier and cheaper to take a sample and make estimates about the population from the sample.

However

- Such conclusions and estimates are not always going to be correct.
- For this reason, we build into the statistical inference "measures of reliability", namely **confidence level** and **significance level**.

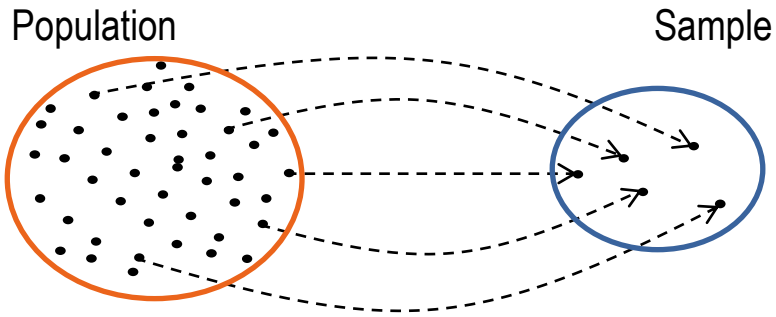
4.1.3 Population and Sample

Population

- the complete collection of all elements of the target group whose characteristics are being studied

Sample

- a collection of few elements selected from the population



4.1.3 Population and Sample

Population Statements

- The CGPA of **all** students in MMU
- The height of **all** mountains in Malaysia
- The **12 months** of weight increment (in kg) per year for Susan
- The number of absentees **per school week** in a school in Melaka: 10, 11, 9, 20, 18

Sample Statements

- The age of **50** students in MMU
- The height of **3** mountains in Canada
- The percentage of failure in SPM examination results for **20** schools in Pahang
- The number of defective components produced by **5** semiconductors' company in Penang

4.1.3 Population and Sample

Determine whether each of the following statements is a **population** or a **sample**.

1. The heights of 100 secondary students in Malaysia
2. The number of books sold by all bookstores in Melaka
3. The prices of all houses sold by a developers
4. The income taxes collected from 50 companies in Malaysia
5. The time taken by a sample of 85 university students in an examination
6. The weights of 14 policemen in a country

4.1.4 Basic Terms

Raw Data

- A collection of observations that have been collected

Element / Member

- A specific subject or object about which the information is collected

Variable

- The characteristic that is being studied which assumes some values for each element

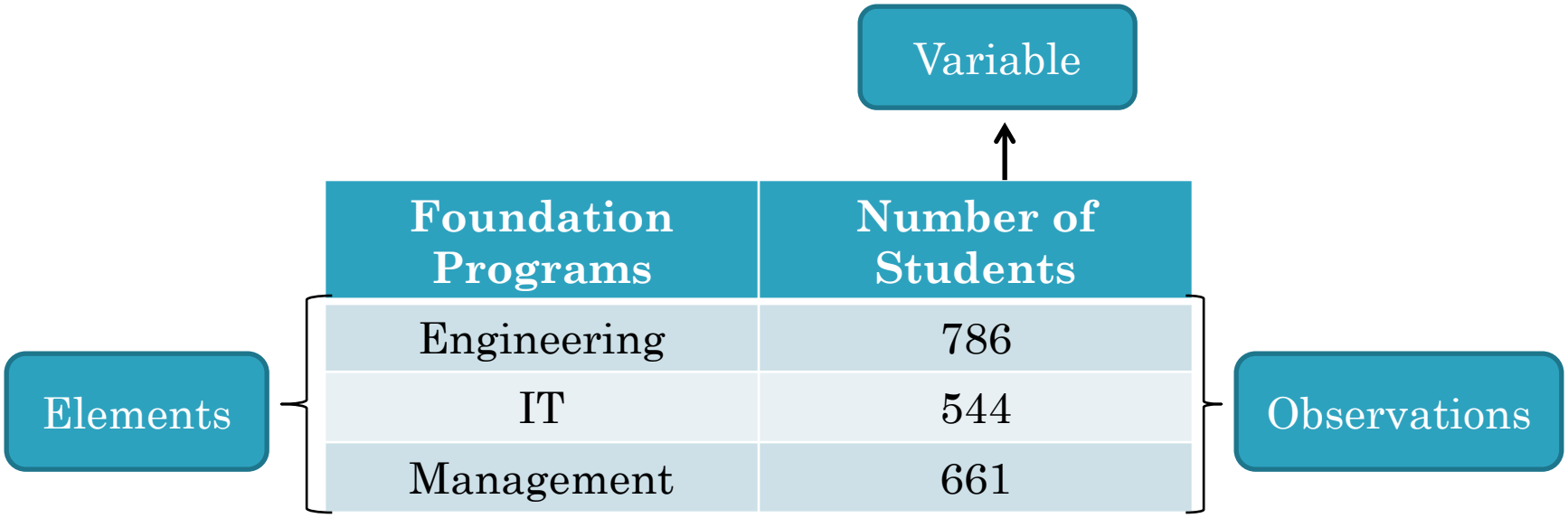
Observation / Measurement

- The value of a variable or characteristic for an element

4.1.4 Basic Terms

Example

The table below shows the number of MMU students for each foundation program of year 2015.



4.1.4 Basic Terms

The following data represent the number of FCI students who registered for the mathematics courses of Trimester I of year 2015.

A Variable

Element

B

Courses	No. of students
Mathematics I	120
Mathematics II	50
Mathematics III	60

C Observation

Which of each are **variable**, **element** and **observation**? List the data for the variables.

4.1.5 Types of Variables

Quantitative Variables

- Variables that **can** be measured numerically
- Examples: height, weight, area

Qualitative Variables

- Variables that **cannot** be measured numerically
- Examples: colour, ethnicity, brands

4.1.5 Types of Variables

Classify the quantitative and qualitative variable:

1. Hair colors
2. Types of product produced in a factory
3. Height of policemen in physical test
4. Weight of cars in parking area
5. Salaries of employees
6. Religious affiliation
7. The number of times 'tail' is observed after a coin is tossed 20 times
8. Brands of cellular phones displayed in a telecommunication store

4.1.5 Types of Variables

Quantitative variables

Discrete variables

Values that can be counted

- The number of cars sold per month by a car sales executive.
- The number of students who attend Statistics class.
- The number of burgers sold per day in McDonalds.
- The number of books read by Chong per year.
- The number of sixes occur when a dice is tossed three times.

Continuous variables

Values that are measured in certain intervals

- The amount of milk that cows produce.
- The heights of children in Kindergarten Sunshine.
- The weight of engineering students.
- The temperature in a frozen room in a restaurant.
- The prices of books in a book store.

4.1.5 Types of variables

Determine whether the given values are from a discrete or continuous data set / variable.

1. A lecturer counts 5 absent students' names in a PPS0016 lecture
2. A visitor found that 23 trees planted in a recreational area were palm trees
3. Speed of a train
4. The number of cars parked in the basement of a shopping complex
5. Serum HDL cholesterol of 55-year-old lady
6. Weights of 35 pots of flowers
7. Time taken by 300 students in an international mental arithmetic examination