Statistics portion of Math 156

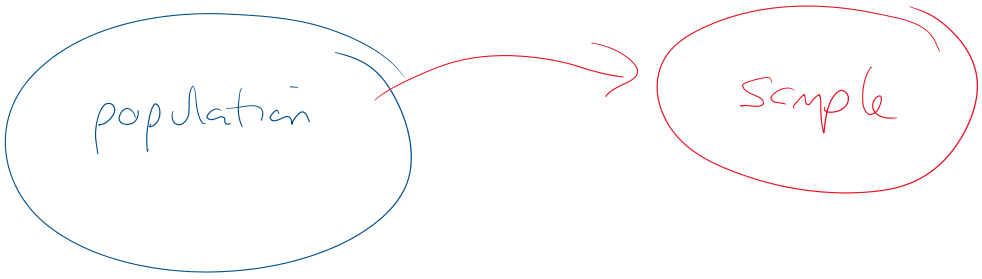
Wednesday, October 25, 2023 11:03 AM

Chapter 5: Describing Data

Section 5.1: Variables and Data

statistics ≡ a branch of applied mathematics concerned with the collection and interpretation of data

ideas of collecting data:



population ≡ the entire set of measurements of interest

note: sometimes not practical or possible to collect data on an entire population

---

Section 5.1: cont'd 2023/10/26

sample ≡ a subset of the measurements of interest

- you must ensure that as far as possible that the sample is representative

the sample should look like the population

two types of statistics:

descriptive – procedures used to summarize and describe the important characteristics of a set of data

inferential – procedures used to draw conclusions or make predictions about a population based on a sample

---

variable ≡ a characteristic that either

(1) changes over time

example: the height of an individual tree measured over a period of years

(2) changes for different individuals or objects under consideration

example: the height of all trees within a certain area at a particular time

experimental unit – individual or object on which a variable is measured

example: we measure the height of a tree

example: we measure the height of a tree

height: variable

tree: experimental unit

---

univariate data - result of a single variable measured on experimental units

- length of adult Chinook salmon

bivariate data - result of two variables

- length and weight of adult Chinook salmon

multivariate data - more than two

---

qualitative variable - measure is a quality or characteristic

→ does not result in a numerical value

examples: political party
nationality
favourite food

quantitative variable - measure is a numerical quantity

examples: height, speed
number of students in a class

for quantitative variables, two types:

discrete or **continuous**

discrete - can only have finite or countable number of values

example of finite:
values can only be one of:
$\{3.75, 5.21, 8.32, 9.21\}$

example of countable:

shoe size: $\ldots, 10, 10\frac{1}{2}, 11, \ldots$

continuous: - can be any real number

example: speed
mass
length

note: although height, for example, is in theory a continuous variable

practically speaking, we usually round our measurement to a certain precision (certain number of decimal places, or to the nearest millimetre)

due to
→ limitations of your measuring instrument
→ limitations on objects being measured (fuzziness of

- limitations of objects being measured (fuzziness of a tennis ball)