

Set 1: Populations and Samples

Stat 260 A01: May 8, 2024

Statistics teaches us how to make intelligent judgments and informed decisions in the presence of uncertainty and variation.

Statistics: The development and application of methods to collect, analyse, and interpret data.

Running Example: We want to determine the average lifespan of a wild orca

Population	Sample
<ul style="list-style-type: none">• Definition: the group of objects under study (every single wild orca on earth) $\text{Population} = \text{Parameter}$	<ul style="list-style-type: none">• Definition: a selection of the population for example a reasonable amount maybe: 25 wild orcas $\text{Sample} \rightarrow \text{Statistic}$
<ul style="list-style-type: none">• Descriptive Measure: <u>Parameter</u> <p>Example Parameter: avg lifespan of all wild orcas on earth</p> <ul style="list-style-type: none">→ usually unattainable or theoretical→ typically represented by greek letters∴ since we can't find parameter we do statistics →	<ul style="list-style-type: none">• Descriptive Measure: <u>Statistic</u> <p>Example Statistic: Avg lifespan of the 25 random wild orcas</p> <p>∴ typically represented using english characters</p>

Random Variables: assignment of a numeric value to every observation or outcome in an experiment

∴ a numeric characteristic that changes object to object

Observation \rightarrow Random Variable \rightarrow Number

Discrete Random Variables	Continuous Random Variables
<p>→ outcome with finite or "infinitely" listable number of possible outcomes</p> <p style="margin-left: 150px;">↓ both mean the same thing essentially</p>	<p>→ Outcomes with an infinite number of outcomes that aren't listable</p>

Example 1: Determine if each of the following are discrete or continuous random variables.

(a) The mass of a turnip in grams.

→ Continuous as you can try to list all possible mass options however you will likely always miss values
for example: 900g, 901g, 902g but you missed out on 900.1, 900.2 and so on...

(b) The number of cats owned by a student.

→ Discrete as there are listable amounts of cats owned (0, 1, 2, 3, ...)
∴ also because it doesn't go into decimals

(c) The number of blossoms on a rose bush.

→ Discrete

∴ we could have 0, 1, 2, 3 etc...

(d) The top running speed of a coyote in km/hr.

→ Continuous ∴ 10, 11, 12 but missed on 10.1, 10.2, 10.3 etc...
∴ unlistable

(e) The price of a cup of coffee in dollars.

→ Technically discrete (0.01, 0.02, 0.03, ...)
→ often treated as continuous as discrete is harder to deal with in terms of calculations

Example 2: Suppose we want to study the average number of tv/movie streaming services (ex: Netflix, Prime etc) that adult Canadians subscribe to. To do so, we conduct a randomized telephone survey of 300 Canadians. Determine the following:

- Population: adult population of Canada
- Sample: 300 Canadians
- Parameter: average number of tv/movie streaming services that all adult Canadians subscribe to
- Statistic: average number of tv/movie streaming services that the 300 Canadians subscribe to
- Discrete or continuous random variable: discrete cause you can list the no of services subscribed to (listable)

Textbook Readings: Swartz 1.1-1.2, EPS 1.1-1.2