

# Special Topic Lecture: Implementing simulation studies

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# What is a simulation study?

## Why run a simulation study?

- to evaluate whether your statistical method works!
- to determine how much variability you might reasonably expect from your estimates
- to calculate power for a study

Especially useful when data model and/or statistical method are complex, and do not have tidy theoretical results.

# What is a simulation study?

## A statistician's laboratory

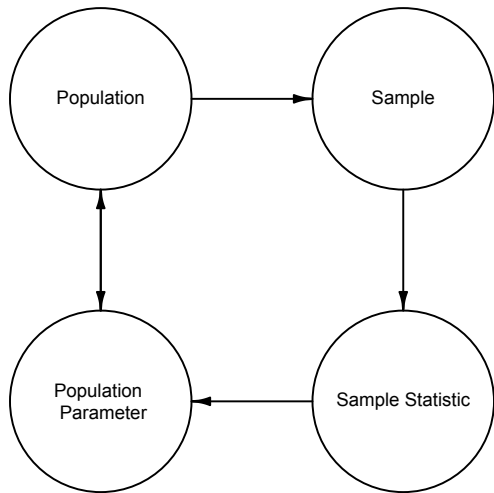
- tight control over the parameters of your data generating model
- systematic exploration of possible parameters
- careful evaluation of how one or more methods perform

# How to run a simulation study

## Key steps

- Identify a data generating model and its associated parameters
- Define the question and scope: which parameters do you want to investigate? what ranges?
- Write code to run the analysis that is easily replicated (maybe write a function?)
- For each distinct set of parameters, generate and analyze data, storing the results. (Note: try to minimize operations within your loops!)
- Summarize the results.

# Circle of Life



## Circle of Life: a simulation study perspective

