Overview

> **The Story of Vandermonde**
>
> The moral of the story is to look for a story!

This unit introduces probability as a framework for studying randomness and uncertainty. From just a couple of axioms, many beautiful properties and countless useful applications flow. Many probability calculations require counting how many objects there are in a set, so this unit also introduces factorials, binomial coefficients, and some basic techniques for counting.

Binomial coefficients satisfy some neat identities, such as Vandermonde's identity, that often arise in probability. As the birds of East Vandermonde reveal to Colin and Sylwia, it is sometimes easier to understand these identities using a story rather than algebra or calculus. More broadly, we use stories throughout this course to gain insight into various concepts and their connections.

Learning Objectives

In this unit, you will:

- Learn a framework for thinking about random experiments
- Study the naive and general definitions of probability
- Explore techniques for counting how many objects are in a large set, such as the number of possible outcomes of an experiment
- Think about story proofs, which allow us to prove certain mathematical results (such as Vandermonde's identity) without resorting to tedious algebra or calculus