STA238 Lecture Notes

Emily Somerset

Table of contents

1 STA238: Probability, Statistics and Data Analysis II

Welcome to the course notes for **STA238**.

These notes contain lecture content for the term, including worked examples, visualizations, and summaries of key concepts.

Use the navigation on the left to access each lecture. You can also download the full notes as a PDF via the "Other formats" link.

2 Lecture 1: Probability Review

2.1 Sample Spaces and Events

A **sample space** is the set of all possible outcomes of an experiment.
An **event** is a subset of the sample space.

Let S be the sample space and $A \subseteq S$ be an event.

2.2 Basic Probability Rules

- $P(S) = 1$
- $P(A) \geq 0$
- If $A \cap B = \emptyset$, then $P(A \cup B) = P(A) + P(B)$

3 Lecture 2: Conditional Probability and Bayes' Rule

3.1 Conditional Probability

The probability of (A) given (B) is:

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

3.2 Bayes' Rule

$$P(B_j \mid A) = \frac{P(A \mid B_j)P(B_j)}{\sum_k P(A \mid B_k)P(B_k)}$$

This allows us to reverse conditional probabilities based on known likelihoods and priors.