Applied Probability and Statistics I Discussion - STAT400

Tom Mitchell

Yi - Fall 2024

Syllabus

Grading

- Homework — 28% (7% each)
- R Projects — 12% (4% each)
- Two exams — 30% (15% each)
- Final exam — 30%

Office Hours

- Tuesday: 1:00 PM - 1:50 PM (in person, MTH 4106)
- Wednesday: 11:00 AM - 11:50 AM (online)

Exams

- 2 midterms and a final exam

Discussion 1: Monday 9/5/2024

Notation and Key Concepts

- Cardinality: For a finite set A, the number of elements is denoted as $|A|$.
- Example: If A = {1, 2, 3, 4, 5}, then $|A| = 5$.

Probability Axioms

The total probability of all outcomes in a sample space must sum to 1:

1. For discrete probability: $\sum_i P_i = 1$
2. For continuous probability: $\int p(x)\,dx = 1$

Homework 1

(b) Probability of heads on an odd-numbered toss

Let H_{odd} denote the event that heads occurs on an odd-numbered toss. The set of odd-numbered tosses is the union of pairwise disjoint events:

$$P(H_{\text{odd}}) = P(H_1 \cup H_3 \cup H_5 \cup \dots)$$

Using the geometric series:

$$P(H_{\text{odd}}) = \sum_{k=0}^{\infty} \frac{1}{3} \left(\frac{2}{3}\right)^{2k}$$

This sum can be simplified as:

$$P(H_{\text{odd}}) = \frac{\frac{1}{3}}{1 - \left(\frac{2}{3}\right)^2} = \frac{\frac{1}{3}}{1 - \frac{4}{9}} = \frac{1}{3} \cdot \frac{9}{5} = \boxed{\frac{3}{5}}$$

Alternate:
1.
make a tableofcontents
— p—1/3—2/3