Probability Distributions

1 Why

We want to talk about probability over finite sets.

2 Definition

A **probability distribution** or **probability mass function** is a real-valued function from a set of outcomes which is non-negative and normalized. A real-valued function on a finite set is **normalized** if the sum over the its results is 1.

The **probability of an outcome** is the result of the outcome under the probability mass function. When the context is clear, we refer to such a function as a **distribution**. We say that the distribution is **over** outcomes.

2.1 Notation

Let A be a set of outcomes and let R be the set of real numbers. Let $p : \Omega \to R$ be such that

- $p(a) > 0$ for each $a \in A$ and

- $\sum_{a \in A} p(a) = 1$