



# 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 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  $p : \Omega \rightarrow \mathbf{R}$  satisfy

- $p(a) > 0$  for each  $a \in A$  and
- $\sum_{a \in A} p(a) = 1$