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 of its results is 1. We will refer to these as *distributions*. The *probability of an outcome* is the result of the outcome under the distribution.

2.1 Notation

Let A be a set of outcomes and Let $p : \Omega \to \mathbf{R}$ be a distribution. Then p will satisfy:

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

Proposition 1. *The range of every probability distribution is contained in* $[0, 1]$.

Proof. TODO

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