Definition 0.0.1 (probability measure)**.** Let Ω be a nonempty set, and let $\mathcal{A}$ be a σ-algebra of subsets of Ω. A probability measure $\mathbb{P}$ is a function that, to every set $A \in \mathcal{A}$, assigns a number in $[0, 1]$. We require:

(i) $\mathbb{P}(\Omega) = 1$.

(ii) (countable additivity) whenever $A_1, A_2, \cdots$ is a countable sequence of disjoint sets in $\mathcal{A}$, then

$$\mathbb{P}\left(\bigcup_{i=1}^{\infty} A_i\right) = \sum_{i=1}^{\infty} \mathbb{P}(A_i).$$

The triple $(\Omega, \mathcal{A}, \mathbb{P})$ is called a **probability space**.