Homework 1

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Exercise 1.1

Let $\mu(x) = \mathbb{P}(X_0 = x)$.

Base Case: The distribution of X_0 is characterized as mu as definition.

Inductive step: Assume that for some $n \geq 0$, $\mathbb{P}(X_n = x)$ can be represented with P and μ. $\mathbb{P}(X_{n+1} = y) = \mathbb{P}(X_n = x)\mathbb{P}(X_{n+1} = y|X_n = x) = \mathbb{P}(X_n = x)P(x, y)$.

Exercise 1.2

$\mathbb{P}(X_1 = y) = \sum_{x \in \Omega} \mathbb{P}(X_1 = y|X_0 = x)P(X_0 = x) = \sum_{x \in \Omega} P(x, y)P(X_0 = x)$.