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Convergence Theorems

- A positive recurrent Markov chain T has a stationary distribution.
- If T is irreducible and has a stationary distribution, then it is unique and

$$\pi_i = \frac{1}{m_i}$$

  where m_i is the mean return time of state i.
- If T is irreducible, aperiodic and has stationary distribution π then

$$\mathbb{P}(X_n = i) \to \pi_i \quad \text{as } n \to \infty$$

- (Ergodic Theorem): If T is irreducible with stationary distribution π then

$$\frac{\#\{t \leq n : X_t = i\}}{n} \to \pi_i \quad \text{as } n \to \infty$$