

Stochastic Modeling

Topics for the second mid-term examinations

17/03/2004 and 24/03/2004

1. Basics about probability

conditional probability,

independence (sets A_1, \dots, A_n or random variables f_1, \dots, f_n)

σ - algebra, filtration,

stopping time.

2. persistent and transient states

definition,

equivalent assertions,

relation between a persistent state and its recurrence time.

3. Ergodic theorems and stationary distributions

ergodic Markov chain,

Ergodic theorems (1. and 2. version),

stationary distribution (how to compute, existence, uniqueness, examples),

relation between the stationary distribution and the mean recurrence time (Thm 2.7.3.),

computation of the mean recurrence time.

4. recall: for $0 < q < 1$

$$\sum_{n=1}^{\infty} nq^n = \dots = \frac{q}{(1-q)^2}.$$