MSG800/MVE170 Basic Stochastic Processes Fall 2014

Exercises on G-S's book

Sections 6.1-6.4 in G-S's book

Problems for own work. As many as possible of Exercises 6.1.1, 6.1.2, 6.1.4 (a), 6.1.10, 6.1.12, 6.2.1, 6.2.2, 6.2.3, 6.3.2, 6.3.3 (a), 6.3.4, 6.4.4, 6.4.6, 6.4.7 and 6.4.8 in G-S's book.

Sections 6.5, 6.8-6.9 and 6.11 in G-S's book

Problems for own work. As many as possible of Exercises 6.5.1, 6.5.2, 6.5.6 (a)-(b), 6.8.1, 6.8.2, 6.8.5, 6.8.6, 6.9.1, 6.9.2, 6.9.3, 6.9.9, 6.9.10, 6.11.1, 6.11.2 and 6.11.4 in G-S's book.

Computer problem for own work. A birth and death process is the continuous time Markov chain described in the first few paragraphs of Section 6.11 in G-S's book. In particular, it has a stationary distribution given by Equation 6.11.2 in G-S's book. Find an approximative numerical value for the probability $\mathbf{P}\big\{\max_{0\leq t\leq 10} X(t)\geq 10\big\}$ for a birth and death process $\{X(t)\}_{t\geq 0}$ with birth intensities $\lambda_0=\lambda_1=\lambda_2=\ldots=1$ and death intensities $\mu_1=\mu_2=\mu_3=\ldots=2$ that is in steady-state (that is, which is started according to its stationary distribution).

The correct value for the probability (according to Patrik's simulations) is approximately 0.0064 ± 0.0001.