Homework 5

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10. (a) One run of the script yields:

$$\pi_1 = 0.2525$$

$$\pi_2 = 0.2521$$

$$\pi_3 = 0.2497$$

$$\pi_4 = 0.2455$$

(b) Solving the system of equations generated by: $\pi P = \pi$ where $\pi = (\pi_1, \pi_2, \pi_3, \pi_4)$ and $\pi_1 + \pi_2 + \pi_3 + \pi_4 = 1$, we get:

$$\pi_1 = 0.25, \pi_2 = 0.25, \pi_3 = 0.25, \pi_4 = 0.25$$

(c) The proof is left as an exercise for the reader.

(d) Using the method of exact simulation, the state at X_0 should be distributed exactly as π. Here I collected 10000 samples and on one run got these estimated values:

$$\pi_1 = 0.25$$

$$\pi_2 = 0.2478$$

$$\pi_3 = 0.2495$$

$$\pi_4 = 0.2524$$