Stat 317/253 Winter 2014 HW #5 January 22

Due **Wednesday January 29th**, **in class** (at the beginning of the lecture period)

Readings: [IPM10e] Section 4.8 (p.249-260)

Problems for Self-Study (NOT for turn in):

1. [IPM10e] Example 4.36, 4.37 on p.253-258

Problems for Turn In:

1. (10 points) [IPM10e] Exercise 4.69
(There is a typo in the 3rd line: "… one of the other $M-1$ urns", should be "$m-1$ urns")

2. (20 points) (This is a revision of Exercise 4.74 in [IPM10e].) A group of n processors is arranged in an ordered list. When a job arrives, the first processor in line attempts it; if it is unsuccessful, then the next in line tries it; if it too is unsuccessful, then the next in line tries it, and so on. When the job is successfully processed or after all processors have been unsuccessful, the job leaves the system. At this point we are allowed to reorder the processors, and a new job appears. Suppose that we use the one-closer reordering rule, which moves the processor that was successful one closer to the front of the line by interchanging its position with the one in front of it. If all processors were unsuccessful (or if the processor in the first position was successful), then the ordering remains the same. Suppose that each time processor i attempts a job then, independently of anything else, it is successful with probability p_i.

   (a)(6 points) Define an appropriate Markov chain to analyze this model.
   (b)(4 points) Is the Markov chain irreducible? Is it aperiodic?
   (c)(10 points) Find the long-run probabilities (Hint: Use the detailed balanced equation).