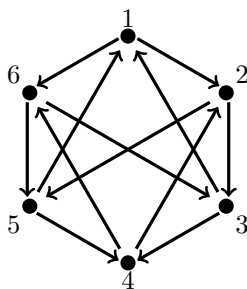


Math 391 : Markov Chains and Mixing Times  
 Homework #3  
 Assigned Tuesday, June 2. Due Tuesday, June 9.

1. Exercise 1.6 from Levin, Peres, Wilmer.
2. Consider the following Markov chain, represented by graph



and by the matrix

$$P = \frac{1}{2} \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 \end{bmatrix}.$$

Find the period for this Markov chain, and also find the partition described in Exercise 1.6.

3. Exercise 1.7 from Levin, Peres, Wilmer.
4. Exercise 1.8 from Levin, Peres, Wilmer.
5. Suppose that  $P$  is reversible, and irreducible and aperiodic. Prove that the matrix  $Q$ , given by

$$Q(x, y) = P(x, y) \frac{\sqrt{\pi(x)}}{\sqrt{\pi(y)}},$$

is symmetric, but that the row-sums may not equal 1.