

E0234: Assignment 7

Due: Friday, March 11, 2016.

It is highly recommended you do not google for the answers to the questions below. You can discuss with your friends, but then mention that in your submission. The writing should solely be your own.

1. Let v be a transient state in a Markov chain, and let π be a stationary distribution for the Markov chain. Show that $\pi(v)$ must equal 0.
2. (MR Problem 6.8) In a connected graph G , an edge is called a *bridge* if the removal of the edge disconnects the graph. If G is a connected graph with n vertices and m edges, and (u, v) is an edge in G , show that for the simple random walk on G , $h_{u,v} + h_{v,u} = 2m$ if and only if (u, v) is a bridge.
3. (MR Problem 6.11) Suppose G is a regular graph (i.e, every vertex having the same degree). Show that its cover time is $O(n^2 \log n)$.
4. Let h_{\max} be the maximum hitting time between any pair of vertices in an n -vertex graph G . Show that the time for a random walk to cover every vertex is $O(h_{\max} \log n)$ with high probability.