

Homework 7

Student Number:

Name:

Problem 1. (30 points) Write down the transition probability matrix for the example in following figure. What is the steady-state visit rate for each of the states?

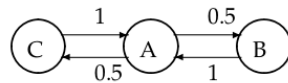


Figure 1: A simple Markov chain with three states; the numbers on the links indicate the transition probabilities.

Problem 2. (20 points) Show that for any directed graph, the Markov chain induced by a random walk with the teleport operation is ergodic.

Problem 3. (30 points) Consider a web graph with three nodes 1, 2 and 3. The links are as follows: $1 \rightarrow 2$, $3 \rightarrow 2$, $2 \rightarrow 1$, $2 \rightarrow 3$. Write down the transition probability matrices and solve for the long-term visit rate for the nodes assuming the following three values of the teleport probability: (a) $\alpha = 0$; (b) $\alpha = 0.5$ and (c) $\alpha = 1$.

Problem 4. (20 points) Given the collection of anchor-text phrases for a web page x , suggest a heuristic for choosing one term or phrase from this collection that is most descriptive of x .