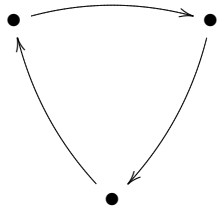
DISCRETE MATHEMATICS, EXERCISES SHEET 1

(1) Draw a directed graph having the following adjacency matrix:

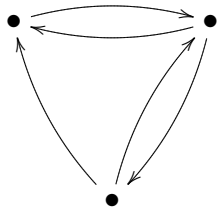
$$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 2 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix}$$

(2) Consider the following directed graphs

(a)



(b)



How do these digraphs represent models of the web? Without making any explicit calculations, how would you rank the pages in each model? Justify your answer.

(3) Write down adjacency matrices W for the two digraphs in Exercise 2. Recall that the adjacency matrix depends on a choice of ordering of the vertices. By choosing different orderings, how many different adjacency matrices do we obtain for each digraph?

(4) Continuing with example (b), suppose that we have 36 surfers, 12 at each site. After one iteration of random surfing, how many surfers will be at each of the sites? What happens in the long run?