

Homework Assignment Four
Complex Networks
College of the Atlantic
Fall 2008

Due Friday November 21, 2008.

Note: If you consult any books or web pages as you do these problems, that's fine, but please cite your sources.

1. **Modularity.** Consider the network shown in the Figure.

- (a) Write down the Google Matrix G . Be sure to briefly explain the definition of G .
- (b) *Optional:* Determine the page rank importance scores for all nodes. To do so you'll need to write a simple program or use Maple.

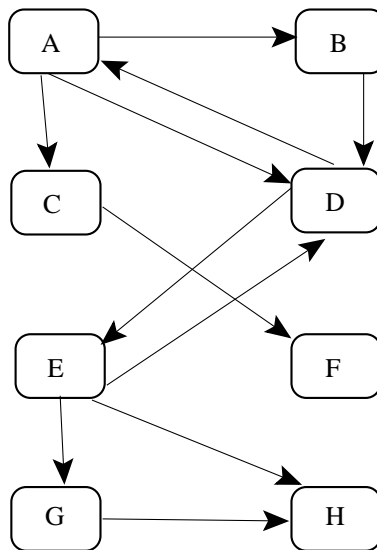


Figure 1: A simplified version of the www.

2. It is week ten and you are delirious and staggering around in your room. Imagine that you move from position to position shown on Fig. 2. If you are at location B or C, you move left or right with equal probability. However, if you are at position A you move right half of the time, and the other half of the time you bang your head against the wall and stay at location A. A similar story holds for position D.
- (a) Write down the transitions among the lettered locations. Express this as a network and as a matrix.
- (b) *Optional:* If you stagger around your room for a very long time, what fraction of the time will you spend at each of the locations? Does it matter where you start?

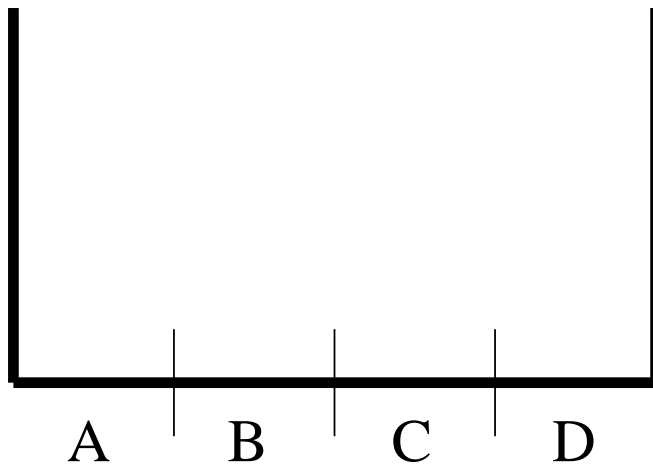


Figure 2: A simplified version of a room in which you wander and hit your head against the wall.