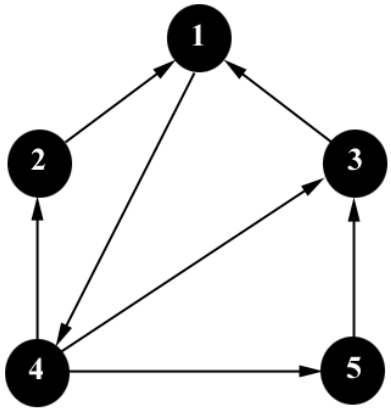
Math 498 Chartier/Greenbaum
Homework #4 Winter 2008

Homework due – Wednesday, February 13, 2008

1. Do problem 5 on p. 264 of the Eigenvalues section of the Course notes (called *evpages* on the course web page).

2. Consider the following network of web pages.



   (a) Write the connectivity matrix G and the Google matrix M for this network.

   (b) Write an M-file that uses the Power Method to find the PageRank of the web pages in this small network of five web pages where convergence is attained when the PageRank vector converges to 3 decimal places in each element of the computed PageRank vector.

   (c) Using the `eig` command, what are the eigenvalues of the Google matrix M. From this information, find the convergence factor of the Power Method for this matrix.

   (d) Now, let us alter the model by assuming that a surfer follows a link on a page 95% (instead of 85%) of the time. Write G and M for this system and the resulting PageRank vector. Again using the `eig` command, find the convergence factor of the Power Method for the Google matrix for this altered model.

Generally, one would not compute the magnitude of λ_2, the second largest eigenvalue. However, theory [Haveliwala et al. 2003] established that λ_2 is bounded above by p which taken to be 0.85 and 0.95 in the problems above.