Math 227 Assignment 8

Due Friday, April 5

1) 1) a) (5 points) Given the simplified link diagram between webpages P_1, P_2, and P_3 described by

- P_1 links to P_2 and P_3
- P_2 links to P_3 and P_1
- P_3 links to P_2,

find the PageRank of P_3, using $d = .85$. NOTE: last I checked, Wolfram Alpha is VERY stupid here and cannot see that 1 is actually an eigenvalue.

b) (5 points) Same problem as a), except now P_1, P_2, and P_3 are related as follows:

- P_1 links to P_2
- P_2 links to P_1
- P_3 doesn't link to anything.

Observe how, with a small number of webpages, the PageRank can be skewed by an isolated site.

2) Calculate the matrix norm for the following matrices. Show the procedure of arriving at your answer:

a) (2 points) $A = \begin{bmatrix} -51 & 60 \\ 30 & -21 \end{bmatrix}$

b) (3 points) $B = \begin{bmatrix} 4 & -7 & 2 \\ -6 & 8 & 0 \end{bmatrix}$

3) Calculate the polar decomposition of the following matrices.

a) (4 points) $A = \begin{bmatrix} 11/10 & 17/10 \\ 23/10 & 19/10 \end{bmatrix}$

b) (6 points) $B = \dfrac{1}{169\sqrt{6}} \begin{bmatrix} -985\sqrt{2} & 509\sqrt{2} & 507\sqrt{2} \\ 505\sqrt{3} & 29\sqrt{3} & 0 \\ -985 & 509 & -1014 \end{bmatrix}$