Homework 3

1. Find AB, BA, and A^2 if well-defined.

 $A = \begin{bmatrix} 1 & -2 \end{bmatrix}, \qquad \qquad B = \begin{bmatrix} 3 \\ 7 \end{bmatrix}$

(b)

(a)

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 3 & 1 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 3 \\ 1 & 4 \\ 2 & 2 \end{bmatrix}$$

(c)

$$A = \begin{bmatrix} 3 & 8 & -2 \\ 4 & 1 & 0 \\ 2 & 3 & 8 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$$

2. Let

$$A = \begin{bmatrix} 1/2 & 1/3 & 1/4 \\ 1/2 & 1/3 & 1/2 \\ 0 & 1/3 & 1/4 \end{bmatrix}$$

- (a) Explain why A is a stochastic matrix.
- (b) Using Perron-Frobenius theorem, what can you conclude about matrix A?
- (c) Find all stationary vectors of A using row reduction.
- (d) Find the probability stationary vector of A.
- 3. Consider the internet



- (a) With damping parameter d = 1, write the transition matrix of this internet.
- (b) With damping parameter d = 1, find the PageRank vector using row reduction.
- (c) With damping parameter d = 0.6, write the transition matrix of this internet.
- (d) With damping parameter d = 0.6, find the PageRank vector using row reduction.
- (e) Compare (b) with (d): does the change in damping parameter affect the PageRank vector? Does it affect the order of the pages?