

## Quiz #3 (CSE 4190.313)

Monday, May 12, 2014

Name: \_\_\_\_\_ ID No: \_\_\_\_\_

1. (15 points)

- (a) (5 points) From the fact that column 1 + column 2 = 2 (column 3) , so that columns are linearly dependent, find one eigenvalue and one eigenvector of  $A$ :

$$A = \begin{bmatrix} 0.2 & 0.4 & 0.3 \\ 0.4 & 0.2 & 0.3 \\ 0.4 & 0.4 & 0.4 \end{bmatrix}$$

- (b) (5 points) Find the other eigenvalues of the Markov matrix  $A$ .
- (c) (5 points) If  $\mathbf{u}_0 = (0, 10, 0)$ , find the limit of  $A^k \mathbf{u}_0$  as  $k \rightarrow \infty$ .

2. (5 points) The identity transformation takes every vector to itself:  $T\mathbf{x} = \mathbf{x}$ . Find the corresponding matrix, if the first basis is  $\mathbf{v}_1 = (1, 2)$ ,  $\mathbf{v}_2 = (3, 4)$ , and the second basis is  $\mathbf{w}_1 = (1, 0)$ ,  $\mathbf{w}_2 = (0, 1)$ .

3. (10 points) True or false, with a good reason or a counterexample.

(a) (3 points) If  $B$  is formed from  $A$  by exchanging two rows, then  $B$  is similar to  $A$ .

(b) (3 points) If a triangular matrix is similar to a diagonal matrix, it is already a diagonal.

(c) (4 points) If  $A$  and  $B$  are diagonalizable, so is  $AB$ .