MATHEMATICS FOR MACHINE LEARNING

LAB 3– 5%

Use Python to answer the following questions.

Hand in pdf and python file to Dropbox

1) Show that the vector $x_1 = \begin{bmatrix} 3 \\ -1 \\ 0 \end{bmatrix}$ is an eigenvector of $A = \begin{bmatrix} 2 & 3 & 0 \\ 1 & 4 & 3 \\ 0 & 0 & 1 \end{bmatrix}$

   b. What is the eigenvalue of x_1?

2) Find all the eigenvalues and eigenvectors for: $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$.

3) Find the eigenspaces for $A = \begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & 2 \\ 2 & 2 & 3 \end{bmatrix}$.

4) Compute all the eigenspaces for $A = \begin{bmatrix} 0 & -1 & 1 & 1 \\ -1 & 1 & -2 & 3 \\ 2 & -1 & 0 & 0 \\ 1 & -1 & 1 & 0 \end{bmatrix}$.

5) Compute the eigenspaces for the matrix $A = \begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{bmatrix}$

6) Find the determinant and trace of the matrix: $A = \begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & 2 \\ 2 & 2 & 3 \end{bmatrix}$.