National University of Computer & Emerging Sciences
Assignment 5

December 7, 2021

Question 1 *Is* $\begin{bmatrix} 4 \\ -3 \\ 1 \end{bmatrix}$ *an eigenvector of the matrix* $\begin{bmatrix} 3 & 7 & 9 \\ -4 & -5 & 1 \\ 2 & 4 & -4 \end{bmatrix}$ *If so, find the eigenvalue.*

Question 2 *compute (a) the characteristic polynomial of matrix A, (b) a basis for each eigenspace for each eigenvalue of A, and (c) the algebraic and geometric multiplicity of each eigenvalue.*

$$\begin{bmatrix} 1 & 2 & 0 \\ -1 & -1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

Question 3 *A is a 3 X 3 matrix with eigenvalues* $\lambda_1 = -1/3$, $\lambda_2 = 1$, $\lambda_3 = 1/3$ *and corresponding eigenvectors eigenvectors* $v_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $v_2 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ *and* $v_3 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, *and* $x = \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$
(a) Find $A^k x$ *(b)Find* A^{50}

Question 4 *Suppose that two competing television channels, channel 1 and channel 2, each have 50 percent of the viewer market at some initial point in* *time. Assume that over each one-year period channel 1 captures 10 percent of channel 2s share, and channel 2 captures 20 percent of channel 1s share. What is each channels market share after one year?*

Question 5 *find the standardmatrixAfor the given linear operator, and If A is diagonalizable, find a matrix P that diagonalizes A.*

$$T(x, y, z) = (3x, y, x - y)$$