Assignments # 4

Note Due date of submission : 27/12/2021

Q1. Find the eigen values and eigen vector of

(i) $\begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ (ii) $\begin{bmatrix} 8 & -9 & 4 \\ 3 & -4 & 3 \\ -3 & 3 & 1 \end{bmatrix}$

Q2 (i) Find the eigenvalues and bases for eigenspaces of A^{25} (ii) Find A^{-2301}

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

Q3: if given A is diagonalizable, then find a matrix P that diagonalizes. Also find $P^{-1}AP$.

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

Assignment No 3

Due date of submission is 25/12/2021.

Q1. Let $f = f(x)$ and $g = g(x)$ be two functions in $[a, b]$

and define as
$$\langle f, g \rangle = \int_a^b f(x)\, g(x)\, dx$$

show that this formula become an inner product space over $C[a,b]$.

Q2. In Q1. if $a=-1$ and $b=1$, $f(x)=1$ and $g(x)=x$

then find

ⓐ $d(f,g) = ?$

(b) $\|f\|$

Q3 Show that the vectors

$V_1 = (1, -2, 3, -4)$, $V_2 = (2, 1, -4, -3)$

$V_3 = (-3, 4, 1, -2)$, $V_4 = (4, 3, 2, 1)$

from an orthogonal basis for R^4 with Euclidean inner product.

Q4: Let P_2 have the inner product $\langle p, q \rangle = \int_0^1 p(x) q(x)\, dx$

Apply Gram-schmit process to transform the standard basis $S = \{1, x, x^2\}$ into orthonormal basis.

Q5 ~~Show that { w = (a, b, c) }~~

Find the least squares solution and error vector of

$$A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \\ 2 & 0 \end{bmatrix}, \quad b = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}.$$