

Assignments # 4

Note Due date of submission : 27/12/2021

Q1. Find the eigen values and eigen vector of

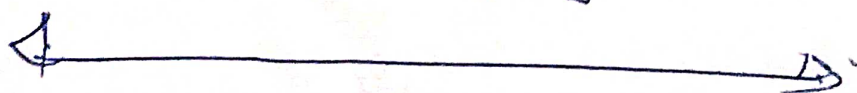
$$(i) \begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \text{ (11) } \begin{bmatrix} 8 & -9 & 4 \\ 3 & -4 & 3 \\ -3 & 3 & 1 \end{bmatrix}$$

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 $P^{-1}AP$.

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



Assignments 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

(a) $\langle f, g \rangle = ?$

(b) $\|f\|$

Q3 Show that the vectors

$$v_1 = (1, -2, 3, -4), v_2 = (2, 1, -4, -3)$$

$$v_3 = (-3, 4, 1, -2), v_4 = (4, 3, 2, 1)$$

form an orthogonal basis for \mathbb{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-Schmidt process to transform the standard basis $\mathcal{S} = \{1, x, x^2\}$ into orthonormal basis.

Q5

~~State that \mathcal{S} is an orthonormal basis~~

find the least squares solution and error vector δ

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

