Linear Algebra second task

Task Requirements Document

Task Requirements

Inner Product, Orthogonality, and Length of Vectors

1. Given The Vectors:

$$a = \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix}, \quad b = \begin{pmatrix} -3 \\ 5 \\ 0 \end{pmatrix}, \quad c = \begin{pmatrix} 1 \\ 2 \\ -2 \end{pmatrix}$$

find:

a) $(a \odot b)\ and\ (b \odot a)$
b) $(a \odot b) + (a \odot c)\ and\ (a) \odot (b + c)$
c) $(3a) \odot (-2c)$
d) Compute 2a+3b−c
e) Determine the magnitude of vector b

2. Compute the distance between

$$\boldsymbol{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \quad \boldsymbol{y} = \begin{bmatrix} -1 \\ -1 \\ 0 \end{bmatrix}$$

Rank of the Matrix and the NULL space

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 1 & 1 & 1 & 1 \\ 3 & 6 & 9 & 12 \end{pmatrix}$$

3. Find the basis of the row space and the rank of the matrix A
4. Find Null A and the nullity of A.

Eigenvalues and Eigenvectors

5. Find all eigenvalues and eigenvectors of matrix A

Deadline

Monday 21/10/2024