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Department **(bs) computer science**

Assignment **final assignment**

Subject **linear algebra**

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Q No 1: Considered The following vector R^3

$$V_1 = \begin{pmatrix} 1 \\ 6 \\ 0 \end{pmatrix} \quad V_2 = \begin{pmatrix} 6 \\ 0 \\ 0 \end{pmatrix} \quad V_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

(a) verify that the general vector $u = (x, y, z)$ can be written as a linear combination of V_1, V_2 and V_3

(Hint) the cofficient will be expressed as function of entries x, y and z of u

Note: this shows that span

$\{V_1, V_2, V_3\} = R_3$ (b) can R_3 be spanned by two vector w_1 and w_2 be sure to Justify

Q No 2: B: Polynomial of degree n does not form a vector space because they ~~lose~~ donest from set closed under

for instance:

$x^n - x^n = 0$

which is not of degree so don't get confused with the set of Polynomial of degree or equal than $n+1$

$n+1$ we often work with

space

Polynomial of degree n is a set which is not closed under addition

For example: if $n=3$ then x^2+x^3 and $-x^3$ are both 3rd degree Polynomial but their sum is not

$$x^2 + x^3 - x^3 = x^2$$

which is not a 3rd degree Polynomial

Q. No 3: (A)

Determine whether or not the following set form vector space over the given fields

(a) The set V of all matrices of the form $\begin{bmatrix} 1 & a \\ b & 1 \end{bmatrix}$ where $a, b \in R$ over R with standard addition and Scalar multiplication

Note - That V is not closed under addition for $a, b, c, d \in R$ we have $\begin{bmatrix} 1 & a \\ b & 1 \end{bmatrix}$ $\begin{bmatrix} 1 & c \\ d & 1 \end{bmatrix}$

$$\begin{bmatrix} 1 & a \\ b & 1 \end{bmatrix} + \begin{bmatrix} 1 & c \\ d & 1 \end{bmatrix} = \begin{bmatrix} 2 & a+c \\ b+d & 2 \end{bmatrix}$$

$\begin{pmatrix} 1 & a \\ b & 1 \end{pmatrix} \begin{pmatrix} 1 & c \\ d & 1 \end{pmatrix}$ for and take

$\begin{pmatrix} 1 & a \\ b & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & c \\ d & 1 \end{pmatrix} = \begin{pmatrix} 1 & \ldots \end{pmatrix}$

$K \cdot \begin{pmatrix} 1 & 0 \\ b & 1 \end{pmatrix} - \begin{pmatrix} 1 & [illegible] \\ [illegible] & 1 \end{pmatrix}$

Q No 4: A:

Let $m \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ 2x2

inverse

$m^{-1} = \frac{1}{\det m} = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} = da - b$

entries and at for matrix we interchange put negative in front of b and c

B:

$\begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$

$= 9 - 8 = 1$

$= 1$

Abdul Wahab Paper

Date:

Q no 2 . B

Explain the linear transformation properties with help of above Problem

$$T(u+v) = T(u) + T(v)$$

Determine whether $T : R^3 \to R^3$ defined by

$$T([x, y, z]) = [x + y, x - y, z]$$

is a linear transformation

Let $u = [x_1, y_1, z_1]$ and $v = [x_2, y_2, z_2]$

Then we want to Prove $T(u+v) = T(u) + T(v)$

$$T = (u+v)[x_1, y_1, z_1] + [x_2, y_2, z_2]$$

$$= T([x_1 + x_2, y_1 + y_2, z_1 + z_2])$$

$$= [x_1 + x_2 + y_1 + y_2, x_1 + x_2 - (y_1 + y_2), z_1 + z_2]$$

and

$$T(u) + T(v)$$

$$= T([x_1, y_1, z_1]) + T([x_2, y_2, z_2])$$

$$= [x_1 + y_1, x_1 - y_1, z_1] + [x_2 + y_2, x_2 - y_2, z_2]$$

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$= [x_1 + y_1 + x_2 + y_2, x_1 - y_1 + x_2 - y_2, z_1 + z_2]$

$= [x_1 + x_2 + y_1 + y_2, x_1 + x_2 - (y_1 + y_2), z_1 + z_2]$

Therefor

$T(u+v) = T(u) + T(v)$