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DEPT: COMP SCI

CC: MAT 204

ASSIGNMENT

Question 1:

Linear transformation is a function from one vector space to another that respects the underlying structure of each vector space.

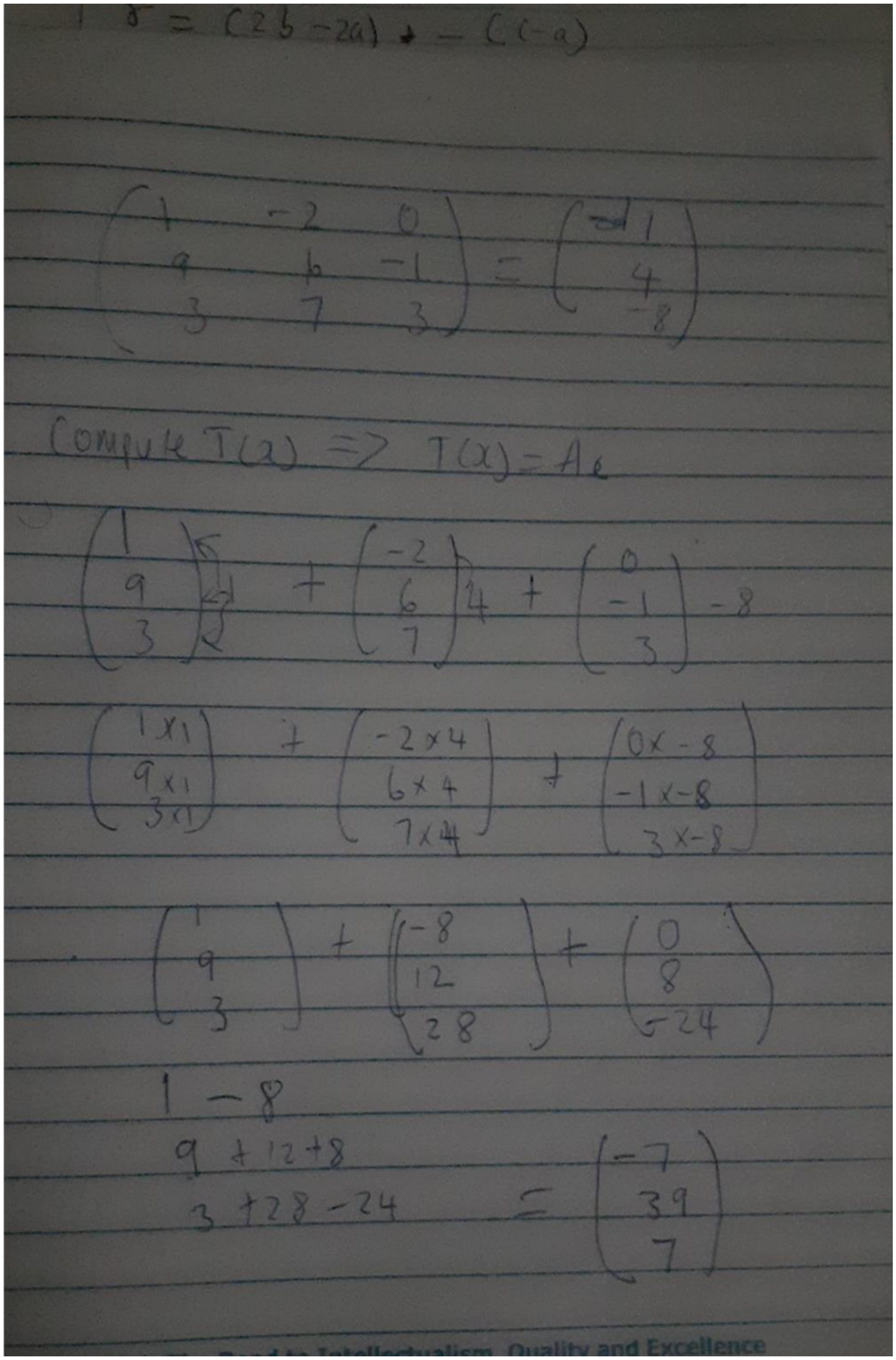
Examples;

1. For all x, y , £ V T (x + y) = T(x) + T(y) (T is addictive)
2. X £ V r £ R T (Rx =rt(x) (T is homogeneous).

Question2:

Given the linear transformation of matrix operator on a vector X compute T(x)

If A(1,9,3) (-2,6,7) (0,-1,3)



$\gamma = (2b - 2a) + - c(-a)$

$$\begin{pmatrix} 1 & -2 & 0 \\ 9 & 6 & -1 \\ 3 & 7 & 3 \end{pmatrix} = \begin{pmatrix} 1 \\ 4 \\ -8 \end{pmatrix}$$

Compute $T(x) \Rightarrow T(x) = Ae$

$$\begin{pmatrix} 1 \\ 9 \\ 3 \end{pmatrix} 1 + \begin{pmatrix} -2 \\ 6 \\ 7 \end{pmatrix} 4 + \begin{pmatrix} 0 \\ -1 \\ 3 \end{pmatrix} -8$$

$$\begin{pmatrix} 1 \times 1 \\ 9 \times 1 \\ 3 \times 1 \end{pmatrix} + \begin{pmatrix} -2 \times 4 \\ 6 \times 4 \\ 7 \times 4 \end{pmatrix} + \begin{pmatrix} 0 \times -8 \\ -1 \times -8 \\ 3 \times -8 \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 9 \\ 3 \end{pmatrix} + \begin{pmatrix} -8 \\ 12 \\ 28 \end{pmatrix} + \begin{pmatrix} 0 \\ 8 \\ -24 \end{pmatrix}$$

$$\begin{matrix} 1 - 8 \\ 9 + 12 + 8 \\ 3 + 28 - 24 \end{matrix} = \begin{pmatrix} -7 \\ 39 \\ 7 \end{pmatrix}$$

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3. X Type equation here.Question 3 ;

Rank of a matrix is the maximum number of linearly independent rows in a matrix A is called the row rank of A and the maximum number linearly independent columns in A is called the column rank of A. Example of a rank matrix

Find the rank of a matrix using normal form,

$$A=\begin{pmatrix} 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \\ 9 & 10 & 11 & 12 \end{pmatrix}$$

Solution:

Reduce the matrix to echelon form,

$$\begin{pmatrix} 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \\ 9 & 10 & 11 & 12 \end{pmatrix} \dashrightarrow \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$