AKINGBOLA AKINTOMIDE

MAT 204

COMPUTER SCIENCE

18/SCI01/013

A **linear transformation,** TDVTDV' is a function that carries elements of the vector space UU (called the **domain)** to the vector space VV (called the **codomain),** and which has two additional properties

1. T(ul+u2)=T(ul)-Pr(u2)T(ul+u2)=T(ul)+T(u2) for all ul/u2GUul/u2GU

D

	1	3	A
i	0	2	
4	2	1	

E =

<3	3	0	A
2	1	-1	
L1			
	3	-1	

2. T(au)=aT(u)T(au)=aT(u) for all uGUuGU and all aEC

A =

	4a		
0	1	3	A
-1	0	2	
4	-2	1	

B =

P	2	1	A
3	1	-1	
	0	1	

C =

n	3	0	A
6	1	-1	
b	2	-4	

LINEAR TRANSFORMATION OF A, IF VEXTOR x = (a.b.c)

A =

r 0	1	3	A
-1	0	2	
4	-2	1	

x =

a
b
c

T(x)= a

0
-1

\+ b

Z-1
0
-2

\+ c

3
2
1

$$\begin{pmatrix} 4 \\ 3 \\ 2 \end{pmatrix} + \begin{pmatrix} b \\ 0 \\ -2b \end{pmatrix} + \begin{pmatrix} 3c \\ 2c \\ c \end{pmatrix}$$

b + 3c

0 + 2c

2b + c J

T(x) = ┌0 +

-a +

4a -

Hence the transformation of $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$ gives; $\begin{pmatrix} 0 + b + 3c \\ -a + 0 + 2c \\ 4a - 2b + c \end{pmatrix}$

$$T(x) = a \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix} + c \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$$

ii. **LINEAR TRANSFORMATION OFBJF VEXTOR x = (a 九 C)**

$$B = \begin{pmatrix} 4 & 2 & 1 \\ 3 & 1 & -1 \\ u & 0 & 1 \end{pmatrix} \qquad x = \begin{pmatrix} a \\ b \\ c \end{pmatrix}$$

+ b

$$\begin{vmatrix} 4a \\ 3a \\ 2a \end{vmatrix} + \begin{vmatrix} 2b \\ b \\ 0\,. \end{vmatrix} + \begin{vmatrix} c \\ -c \\ < c > \end{vmatrix}$$

$2a + 0 + c$

$$T(x) = \begin{pmatrix} 4a + 2b + c \\ 3a + b - c \end{pmatrix}$$

Hence the transformation of x = gives;

/ 6	1	-1	a	4a + 2b + c + b -
5	2	-4	b	3a c
				2a + c

iii. LINEAR TRANSFORMATION OFC, IF VEXTOR x = (a,b,C)

4

c >

4 + b < ■> 3 + c 0

6 1 -1

< 5 > 2 -4

«•

3 0

(5a + 2b - 4c)

T(x)= a

4a 3b 0

6a -c

<5a 2b J

T(x) = 4a + 3b

6a b - c

Hence the transformation. Gives

$$\begin{pmatrix} 4a + 3b + 0 \\ 6a + b - c \\ 5a + 2b - 4c \end{pmatrix}$$

iv. LINEAR TRANSFORMATION OFDJF VEXTOR x = (a.b.c)

$$D = \begin{bmatrix} 0 & 1 & 3 \\ 1 & 0 & 2 \\ 4 & 2 & 1 \end{bmatrix} \qquad x = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

$$\begin{pmatrix} 0 \\ 1 \\ 4 \end{pmatrix} + b \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} + c \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

$$T(x) = \begin{pmatrix} 0 \\ a \\ 4a \end{pmatrix} + \begin{pmatrix} b \\ 0 \\ 2b \end{pmatrix} + \begin{pmatrix} 3c \\ 2c \\ c \end{pmatrix}$$

$$T(x) = \begin{pmatrix} 0 + b + 3c \\ a + +0 + 2c \\ 4a + 2b + c \end{pmatrix}$$

Hence the transformation of $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$ gives; $\begin{pmatrix} 0 + b + 3c \\ a + 0 + 2c \\ 4a + 2b + c \end{pmatrix}$

v. LINEAR TRANSFORMATION OFEJF VEXTOR x = (a,b,C)

$x = \begin{pmatrix} a \\ b \\ c \end{pmatrix}$

2 1-1

3

T(x)= r A 1

3

$+ \; c \begin{pmatrix} 0 \\ -i \\ L^{-1} \end{pmatrix}$

$$\begin{pmatrix} 3a \\ 2a \end{pmatrix} + \begin{pmatrix} 3b \\ b \end{pmatrix} + \begin{pmatrix} 0 \\ -c \end{pmatrix}$$

| 、a > | | 、3b) | | <-c |

< 1)

$$\begin{vmatrix} 3a & + 3b + 0 \\ 2a & + b - c \\ a & -3b - c \end{vmatrix}$$

Hence the transformation of $\langle a \rangle$ b gives; <3a + 3b + 0

a - 3b - c _y

2a + b - c

c

┘ a - 3b - c _y