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MAT 204

COMPUTER SCIENCE

18/SCI01/084

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	J

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

A =

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

B =

P	2	1	A
3	1	-1	
	0	1	J

C =

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

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

A =

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

x =

a
b
c

T(x)= a

0
-1

\+ b

Z-1
0
-2

\+ c

3
2
1

4	+	b	+	3c
3		0		2c
2 >		、-2b>		c _

b + 3c

0 + 2c

2b + c J

T(x) = Γ0 +

-a +

4a -

Hence the transformation of

a
b
c J

gives;

^0 + b + 3c		
-a +	0	+ 2c
_4a - 2b + c」		

T(x)= a

/* > 2
1
0

\+ c

1
-1
、1 .

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

B =

<4	2	1
+ b3	1	-1
u	0	1 J

x =

a
b
c
>

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

2a + 0 + c

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

Hence the transformation of gives; 4a + 2b + c + b -

/ 6 1 -1 x = a 3a c

5 2 -4 b

2a + c

iii. LINEAR TRANSFORMATION OFC, IF VEXTOR

x = (a,b,C) 3 0

4

T(x)= a

4a 3b 0

6a -c

<5a 2b J

c >

T(x) = 4a + 3b

6a b - c

4 + b < ■> 3 + c 0 4c

1

6 -1

< 5 > 2 -4

«•

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)

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

0 1 < 4 >	+ b	< ■ > 1 0 .2	+ c	3 2

T(x)= 0 a 4a + b 0 2b) + 3c 2c c < >

T(x) =

0+ b + 3c

a + +0 + 2c

4a + 2b + c

Hence the transformation of "a " b c X. gives; < 0 + b + 3c

a + 0 + 2c

4a + 2b + c y

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

x = a

b 2 1-1

c

\- 3

T(x)= r A 1

\+ c 0 -i L-1 J 3

3a 2a	+	< > 3b b	+	0 -c

、a >		、3b)		<-c

< 1)

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

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

$a - 3b - c \rangle$

2a + b - c

c

┘ a - 3b - c _y