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MAT 204

COMPUTER SCIENCE

17/SCI01/027

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

|  |  | 1 | 3 | A |
| --- | --- | --- | --- | --- |
|  | i | 0 | 2 |  |
| D = |  |  |  |  |
|  | 4 | 2 | 1 |  |
|  |  |  | J |

|  | <3 | 3 | 0 | A |
| --- | --- | --- | --- | --- |
| E = | 2 | 1 | -1 |  |
|  | L1 | 3 | -1 | *J* |

4a

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 0 | 1 | 3 | A |  | P | *2* | 1 | A |  | p | 3 | 0 | A |
| A = |  | -1 | 0 | 2 |  | B = | 3 | 1 | -1 |  | C = | 6 | 1 | -1 |  |
|  | L | 4 | -2 | 1 | J |  |  | 0 | 1 | *J* |  | b | 2 | -4 | *J* |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A = | *r* | 0 | 1 | 3 | A | x = | a |
|  |  | -1 | 0 | 2 |  |  | b |
|  | L | 4 | -2 | 1 | J |  | c |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| T(x)= a | 0 | + b | Z-1 | + c | 3 |
|  | -1 |  | 0 |  | 2 |
|  | 〔4」 |  | -2 |  | 1 |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| 4 |  | b |  | 3c |
|  | + |  | + |  |
| 3 |  | 0 |  | 2c |
| 2 > |  | 、-2b> |  | c \_ |

|  |  |
| --- | --- |
| b + 3c |  |
| 0 + 2c |  |
| 2b + c | *J* |

T(x) =「0 +

-a +

4a -

|  |  |  |  |
| --- | --- | --- | --- |
| Hence the transformation of | a | gives; | ^0 + b + 3c |
|  | b |  | -a + 0 + 2c |
|  | c J |  | \\_4a - 2b + c」 |

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

T(x)= a

| /\* > *2* |  | 1 |
| --- | --- | --- |
| 1 | + c | -1 |
| 0 |  | 、1 . |

+ b

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| B = | <4 | *2* | 1 |  | x = | a |
|  | 3 | 1 | -1 |  |  | b |
|  | u | 0 | 1 | *J* |  | c > |



T(x) =

3a + b - c

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4a |  | 2b |  | c |
|  | + |  | + |  |
| 3a |  | b |  | -c |
| 2a |  | 0 . |  | < c > |

2a + 0 + c

Hence the transformation of

gives;

4a

3a

+ 2b + c + b - c

2a + c

**iii.**

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

4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| /6 | 1 | -1 | x = | a |
| 5 | 2 | -4 |  | b |
|  |  | *J* |  | 、c > |

3

0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | + b | < ■>3 | + c | 0 |
| 6 |  | 1 |  | -1 |
| < 5 > |  | 、2 |  | -4 |
|  |  |  |  | *«• J* |
|  |  |  |  |  |

T(x)= a

3b

0

4a

6a

-c

<5a

2b J

T(x) =

4a

+ 3b

6a

b - c



Hence the transformation. Gives



| 4a + 3b + 0 |
| --- |
| 6a | + | b - c |  |
| 5a | + | 2b - 4c | *J* |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| D = | *r* | 0 | 1 | 3 | A | x = | a |
|  |  | 1 | 0 | 2 |  |  | b |
|  | L | 4 | 2 | 1 | J |  | < c |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 |  | < ■> 1 |  | 3 |
|  | + b |  | + c |  |
| 1 |  | 0 |  | 2 |
| < 4 > |  | .2 |  |  |

T(x)=



| 0 |  | b |
| --- | --- | --- |
|  | + |  |
| a |  | 0 |
| 、4a |  | 、2b) |

|  | 3c |
| --- | --- |
| + | 2c |
|  | c< > |

T(x) =

a + +0 + 2c

|  |  |  |  |
| --- | --- | --- | --- |
| Hence the transformation of | "a " | gives; | < 0 + b + 3c |
|  | b |  | a + 0 + 2c |
|  | cX. *J* |  | 4a + 2b + c *y* |

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

T(x)=

2 1-1

3

1

3

|  |  |  |
| --- | --- | --- |
| x = | a |  |
|  |  | b |  |
|  |  | c |  |
|  |  |  | -Z |
|  |  | *r* | A |
|  |  | 0 |  |
| + | c |  |  |
|  |  | -i |  |
|  |  | L-1 | *J* |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3a |  | < > 3b |  | 0 |
|  | + |  | + |  |
| 2a |  | b |  | -c |
| 、a > |  | 、3b) |  | <-c > |

< 1 )



|  |  |  |  |
| --- | --- | --- | --- |
|  | 3a | + 3b + 0 |  |
|  | 2a | + b - c |  |
|  | a | -3b - c | *J* |

< a >

gives; <3a + 3b + 0

Hence the transformation of

b

2a + b - c

c