## Merging Man and maths

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(Exercise 6.3) Q1 Check which of the following define transformations from R3 to Rt? (is T(x1,x2,x3) = (x1-x2, x1-x3) Solo Given transformation is T(X1-1K, 2K-1K) = (X1-X2, X1-X3) : Let u, = (x1, x2, x3) 4 Uz = (51, 42, 43) ER (1) then we place T(u1+u2) = T(u1) + T(u2) Now T(U1+U3) = T((x1, x2, x3)+(x1, y2, y3)) = T(x,+31, x2+34, X3+33)  $= \left( \left( \chi_1 + \chi_2 \right) - \left( \chi_2 + \chi_2 \right) - \left( \chi_1 + \chi_2 \right) - \left( \chi_2 + \chi_2 \right) \right)$ = ( t- 14+1K , 14-1K-14+1K ) = (x1-14+16-1K, 16-1K+1K-1K) = (x1-x2, x1-x3) + (51-52, 51-53) = T(X1, X2, X3) + T(51, 32, 35)  $= T(u_i) + T(u_i)$ (ii) Les acr d u,= (x1,x2,x3) e R3 Then we prove T(au1) = aT(u1) How  $T(\alpha u_i) = T(\alpha(x_i, x_i, x_i))$ = T ( axi, axi, axi). = (ax1-ax2, ax1-ax3)  $= \alpha(x_1-x_2, x_1-x_3)$ 

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is a linear transformation from R to R2

= aT(x1,x2,x3)

= aT(u1)

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(ii) T(x1, x2, x3) = (|X1, X1-X3)
    Silv Ginen transformation is
     T(x_1,x_2,x_3) = (|x_1|, x_2-x_3)
     Let U1 = (X1, X2, X3).
      & U2 = (41, 42, 43) ER Than
  (i) T(u_1+u_2) = T(u_1) + T(u_2)
   T(u_1+u_2) = T((x_1,x_2,x_3)+(x_1,x_2))
               = T ( x1+31, x2+32, x3+33)
               = ( (x1+x1) , (x2+x2) - (x3+x2) )
  S. T(u,+u2) = (|x1+>1|) x2+>1-x3-43)
  How
   T(u_i) + T(u_2) = T(x_i, x_i, x_i) + T(u_i) + T(u_i)
                = ( | 111) + ( EK- 1K ( | 1K ) =
                ( EC-2K + EK- 2K , lic|+|iK| ) =
 (\xi C - \xi K - \xi C + \xi K) = (\xi V) T + (iV) T
   Fram (1) of (2)
   T(u_1+u_2) \neq T(u_1)+T(u_2)
  Hence T is not a linear transformation from R to R.
 (iii) T(x1,x2, x3) = (x1+1, x2+x3)
'Sol: Given transformation is
 (EK+1K (1+1K) = (EK (EK (1K))T
 let U1 = (x1, x2, x3)
 4 (42 = (51, 41, 42) ER3
(1) T(u_1+u_2) = T(u_1) + T(u_2)
Now
 T(u_1+u_2) = T((x_1,x_2,x_2)+(y,y,y,y))
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  T(41+42) = T(X1+71, X2+72, X2+73)
             = (X1+)1+1 , X2+72 + X3+73)
   T(41+42) = (x1+11+1, x2+x3+12+73)
  T(41) + T(42) = T(X1,1X2,1X3) + T(81,74,73)
               = (x1+1, x2+x3) + (51+1, 52+33)
                 = (X1+1+51+1 , X2+X3 + Y2+Y3)
   (\varepsilon t + i t + \varepsilon k + i k c + i t) = (\omega) T + (i \omega) T
   From (1) 4 (1)
      T(U_1 + U_2) \neq T(U_1) + T(U_2)
   Hence T is not a linear transformation from R to R2.
(EK (O) T (X1, X2) = (O, X3)
Solo Ginen transformation is
                                             Available at
                                         www.mathcity.org
 (\varepsilon K(0) = (\varepsilon K, \varepsilon K(1K)T)
 Let. U1 = (X1, X2, X3)
   4 U2 = (41, 42, 43) ER3 than we prove.
(i) T(u_1+u_2) = T(u_1) + T(u_2)
  Nau!
   T(u_1+u_2) = T((x_{11}x_{21}x_3) + (x_{12}x_2))
               = T (X1+31, X1+31, X3+33)
               = (0, x3+y3)
               = (0, x_3) + (0, y_3)
               = T(x,, x, K, K, K, K)T =
   ~ T(41+42) = T(41) + T(42)
 (ii) Let a ER of U1 = (X13X23X3) ER than
     T(aui) = aT(ui)
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How T(all) = T(a(xisxx, xs))

$$T(au_1) = T(ax_1, ax_2, ax_3)$$

$$= (0, ax_3)$$

$$= a(0, x_3)$$

$$= aT(x_1, x_2, x_3)$$

$$T(au_1) = aT(u_1)$$

Have  $T$  is a linear transformation for  $R^3$  to  $R^1$ .

(V)  $T(x_1, x_2, x_3) = (\frac{x_1 + x_2}{x_3}, x_3)$ 

Selve Grien transformation is
$$T(x_1, x_2, x_3) = (\frac{x_1 + x_2}{x_3}, x_3)$$

Let  $u_1 = (x_1, x_2, x_3) \in R^3$  then we found
$$T(x_1, x_2, x_3) = (\frac{x_1 + x_2}{x_3}, x_3)$$

Let  $u_1 = (x_1, x_2, x_3) \in R^3$  then we found
$$T(u_1 + u_2) = T(u_1) + T(u_2)$$

$$T(u_1 + u_2) = T(x_1, x_2, x_3) + (x_1, x_2, x_3)$$

$$= (\frac{x_1 + x_1 + x_2 + x_2}{x_3}, x_3 + x_3)$$

$$= (\frac{x_1 + x_2 + x_2}{x_3}, x_3) + (\frac{x_2 + x_2}{x_3}, x_3)$$

$$= (\frac{x_1 + x_2 + x_2}{x_3}, x_3) + (\frac{x_2 + x_2}{x_3}, x_3)$$

$$= (\frac{x_1 + x_2 + x_3}{x_3}, x_3) + (\frac{x_2 + x_2}{x_3}, x_3 + x_3)$$

$$= (\frac{x_1 + x_2}{x_3}, x_3) + (\frac{x_2 + x_3}{x_3}, x_3 + x_3)$$

$$= (\frac{x_1 + x_2}{x_3}, x_3) + (\frac{x_2 + x_3}{x_3}, x_3 + x_3)$$

$$= (\frac{x_1 + x_2}{x_3}, x_3) + (\frac{x_2 + x_3}{x_3}, x_3 + x_3)$$

From  $0 \neq 0$ 

$$T(u_1 + u_2) \neq T(u_1) + T(u_2)$$

Hence  $T$  is not a linear transformation for  $R$  to  $R$ .

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(vi) T(x1,x2,x3) = (3x1-2x2+x3, x3-3x2-2x1)
Soli. Crimen transformation is
 T(X_1,X_2,X_3) = (3X_1-2X_1+X_3, X_3-3X_2-2X_1)
Let U1 = (XIIXIIX)
, & U2 = (31, 32, 33) E R3 then we prove
(i) T(u_1+u_2) = T(u_1)+T(u_2)
 T(41+42) # T((x1,x2,x3)+(51,32,3))
           = T(X1+11, X1+11, X3+13)
      = \left(3(3_1+3_1) - 2(3_1+3_1) + (3_2+3_3) - (3_3+3_1) - 2(3_1+3_1)\right)
      = (3×1-2×1+×3+3>1-2>1+33, ×3-3×12-2×1+>3-3>2-2>1)
      = (3x1-2x2+x3, x3-3x2-2x1) + (351-252+33, 33-332 -251)
     ( EK ( 1 K ( ) T + ( EX ( 1 K ( ) T =
       = T(u_1) + T(u_2)
(11) let a E R & u; = (x1,x2,x3) E R3 then we place
  T(au1) = aT(u1)
Now T(aui) = T(a(x1,x2,x3))
           = T(ax1, ax2, ax3).
          = (3ax1-2ax2 + ax3, ax3 - 3ax2 - 2ax1)
           = a(3x1-2x2+x3, x3-3x2-2x1)
            = aT(x,,x1,x3)
             = aT(u1)
 Hance T is a linear transformation from R' to R'.
Q2 Show that each of the following defines linear
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transformation from  $R^3$  to  $R^3$ . (i)  $T(x_1,x_2,x_3) = (x_1-x_2, x_2-x_3, \hat{x}_1)$ Self: Given transformation is

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T(X1, X2, X3) = (X1, X2, X4-X4)
 Let U1 = (X1, X2, X3)
  4 · U2 = (31, 91, 93) E R3 then we
(i) T(u_1+u_2) = T(u_1) + T(u_2)
Nou
:T(U1+U2) = T((H11H1)+(H1))
          = T(X1+31, X2+32, X3+33)
          x (X1+31-X2-31 , X2+31-X3-33 , X1+31)
           = (X1-X2 + 31-32 , X2-X3+32-33 , X1+31 ).
           = (x1-x2, x2-x3, x1) + (>1-y2, y2-y3, >1)
           = T(X_1, X_2, X_3) + T(Y_1, Y_2, Y_3)
           = T(u1) + T(U2)
T(\alpha u_1) = T(\alpha(x_1, x_2, x_3))
        = T(ax1, ax1, ax3)
        = (ax1 - ax2, ax2 - ax3, ax1)
        = a(x1-x2, x2-x3, x1)
        = aT(x1,xx,x3)
        = aT(ui)
     T is a linear transformation from R to
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 $T(x_1,x_2,x_3) = (x_1+x_2, -x_1-x_2, x_3)$ Sd. Gimen transformation is  $T(x_1,x_2,x_3) = (x_1+x_2,-x_1-x_2,x_3)$ let U1 = (X1, X2, X3) Us = (51, 72, 73) E R3 them we (1) T(41+42) = T(41)+T(42)

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Now
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 $T(u_{1}+u_{1}) = T((x_{1},x_{1},x_{2}) + (x_{2},x_{2}))$   $= T(x_{1}+x_{1},x_{2}+x_{2},x_{3})$   $= (x_{1}+x_{1},x_{2}+x_{2},x_{3}) - (x_{1}+x_{2}),x_{3}+x_{3})$   $= (x_{1}+x_{1}+x_{2}+x_{3}+x_{4}+x_{5})$   $= (x_{1}+x_{2}+x_{3}+x_{4}+x_{5})$   $= (x_{1}+x_{2}+x_{3}+x_{4}+x_{5})$   $= (x_{1}+x_{2}+x_{4}+x_{5}+x_{5}+x_{5})$   $= (x_{1}+x_{2}+x_{4}+x_{5}+x_{5}+x_{5})$   $= (x_{1}+x_{2}+x_{4}+x_{5}+x_{5}+x_{5})$   $= T(x_{1}+x_{2}+x_{5}+x_{5}+x_{5})$   $= T(x_{1}+x_{2}+x_{5}+x_{5}+x_{5}+x_{5})$   $= T(x_{1}+x_{2}+x_{5}+$ 

(ii) Let  $\alpha \in R \iff u_1 = (x_1, x_2, x_3) \in R^3$  then we prove  $T(\alpha u_1) = \alpha T(u_1)$ 

Now

 $T(\alpha U_1) = T(\alpha(x_1, x_2, x_3))$   $= T(\alpha x_1, \alpha x_2, \alpha x_3)$   $= (\alpha x_1 + \alpha x_2, -\alpha x_1 - \alpha x_2, \alpha x_3)$   $= \alpha(x_1 + x_2, -x_1 - x_2, x_3)$   $= \alpha T(x_1, x_2, x_3)$   $= \alpha T(U_1)$ 

Hence T is a linear transformation from R3 to R3

(ii)  $T(x_1, x_2, x_3) = (x_2, -x_1, -x_3)$ 

Sel. Given transformation is  $T(X_1, X_2, X_3) = (X_2, -X_1, -X_3)$ 

Let U1 = (XIJNES X3)

4 Us = (31, 32, 33) ER3 than we prove

(1) T(u1+u2) = T(u1) + T(u1)

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T(u_1+u_2) = T(x_1+y_1, x_2+y_2, x_3+y_3)
              = (18+1K) - (18+1K) - (18+1K) =
             = (x2+2K , 14-1K- , 2C+2K) =
            = (X_1, -X_1, -X_3) + (Y_2, -Y_1, -Y_3)
             = T(X1, X2, X3) + T(31, Y2, Y3)
              (i\nu)\tau + ((\nu)\tau \cdot x
: (ii) Lat a E R & U1 = (x1, x2, x3) E R3 than we prove
  T(aui) = aT(ui)
 Now
 T(\alpha u_i) = T(\alpha(x_i)x_i,x_i)
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         = T(ax1, ax2, ax3)
          = (ax2, -ax1, -ax3)
           = a(x2, -x1, -x3)
           = aT(x1,x2,x3)
            = aT(ui)
 Hence T is a linear transformation from R3 to R3.
(iv) T(X_1, X_2, X_3) = (X_1 - 3X_2 - 2X_3, X_2 - 4X_3, X_3)
Selv Given transformation is
 T(X_1, X_2, X_3) = (X_1 - X_1, X_2 - X_3, X_2 - X_3, X_3)
 Let U1 = (X1, X2, Xx)
  & Uz = (51, yz, yz) ER3 than we prove
(i) \quad T(u_1 + u_2) = T(u_1) + T(u_2)
Now
T(u_1 + u_2) = T((x_1, x_2, x_3) + (y_1, y_2, y_3))
             = T (X1+31, X2+32, X3+33)
              = ((X1+31)-3(X2+32)-2(X3+33); (X2+32)-4(X3+33), X3+33)
             = (X1-3X2 - 2X3+31-322-253, X2-4X3 +78-453, X3+73)
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T(41+42) = (x1-3x2-2x3, x2-4x3, x3)+(31-332-23, 32-43, 33)
     = T(u1) + T(u2)
(ii) let a E R & U1 = (X1, X2, X3) E R3 then we prove
  T (aui) = aT(ui)
Nau
                                    Available at
T(\alpha U_1) = T(\alpha(x_1, x_2, x_3))
                                www.mathcity.org
     = T ( axi, axi, axi)
  = (3ax1 -3ax2 - 2ax3, ax2 - 4ax3, ax3)
        = a(3x1-3x2-2x3, x2-4x3, x3)
  = aT(x1,x2,x3)
         = aT(u1)
Hence T is a linear transformation from R3 to R3.
(V) T(X_1, X_2, X_3) = (X_1 + X_3, X_1 - X_3, X_2)
Sel. Given transformation is
 T(x,xx,xx) = (Ex,x,x)T
Let U1 = (x11x2xxx)
 4. 42 = (>1,>42, 43) € R3 then we prove
T(U1+U2) = T(U1) + T(U2)
 Now.
 T(UI+UL) = T((X1)X2) + (51) 131))
         = T (X1+31, X2+32, X3+33)
          = ( (x+1x)+(x+1x) , (x(+1x)+(x+1x)) =
         = (x,+x3,+5,+y3, x,-x3,+5,-y3, x2+y2)
          = (X1+X3 5 X1-X3, X2) + (51+33, 51-33, 32)
           (ととしょといく) T+ (ととくはん) T =
        = T(u1) + T(u2)
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(11) Leic a E R & U1 = (X1, X1, X1) E RA than we place
  T(\alpha u_1) = \alpha T(u_1)
 MAN
 T(au1) = T(a(x1)x2, x3)).
        = T(ax1, ax2, ax3)
         = ( ax1+ ax3, ax1-ax3, ax2)
          = a(x1+x3, x1-x3, x2)
        = aT(x1,2x2, x3)
          = at(u1)
  Hence T is a linear transformation from R3 to R3
Q3 Show that each of the following transformations is
  not linear.
(i) T: R2 __ R defined by T(X13X2) = X1X2
Sels Given transformation is
   2K_1K = (11K_1K)T
 (ek U, = (x1, x2)
  d uz = (41, 42) ER then we prove
 (1)T(u_1+u_2) = T(u_1) + T(u_2)
  T((1+42) = T((x1,x1)+(31,32))
           = T (X1+31, X1+31)
             = (x1+31)(x2+3L) ---
  T(u_1) + T(u_2) = T(x_1, x_2) + T(y_1, y_2)
                 X1X2 + 5132 -----
   for 0 4 @ T(u1+u2) $ T(u1)+T(u2).
   Hence T is not a linear transformation from
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(ii) T: R= R3 defined by T(x1,x2) = (x1+1,2x2, x1+x2)
Sol. Gimen transformation
   T(X_1, X_2) = (X_1, X_1, X_1, X_1 + X_2)
Let U, = (X1) X2)
 4 Uz = (41,42) ER then we
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(i) T(u_1+u_2) = T(u_1)+T(u_2)
T(u_1+u_2) = T((x_{i1}x_i)+(x_{i2}x_i)
           * T(x1+31, x1+31)
          = (x1+1K) + (1C+1K) + (x1+1K) =
           * (x1+31+1, 2x2+231, x1+x2+31+32) ---- 1
(1 (1) + T(u) + T(x1) + T (2) + T (2)
            * (X(+1), ZX; , X(+Xz) + ( Y(+1), ZYz , Y(+)x)
            = (x1+51+2, 2x2+2y2, X1+X2+51+y2) --
from 0 4 0
    T(u_1+u_2) \neq T(u_1) + T(u_2)
Hance T is not a linear transforation from R to R3.
(iii) T: R3 ____ R2 defined by T(x1,x2,x3) = (|x11,0)
 Sdi Ginen transformation
 (0, (11K)) = (1K, 1K(1X)T
 Let U1 = (X1, X2, X3)
  1 U3 = (512723 y3) E R3 then
                                  we
 (i) T(u_1+u_2) = T(u_1) + T(u_2)
  T(u_1+u_2) = T(x_1,x_1,x_1) T = (x_1+y_1)T
       = T(X1+31, XL+3L, X3+33)
```

```
T(u_1+u_2) = (1x_1+x_1)T
  T(U1)+T(U1) = T(X1)X1) + T(Y1)Y1) .
               = (|x||_{2}) + (|x||_{2})
                = ( | 1 | + | 1 | K | ) =
 : Fim 1 4 1
T(u_1+u_2) \neq T(u_1)+T(u_2)
  Hance T is not a linear transformation from R3 to R3.
  (14) T: R2 ___, R2 defined ly T(X1, X2) = (X1, X2).
Sign Ginen transformation
  (iK_ciK) = (iK_ciK)T
  Let U1 = (XISXE)
    4 Uz = (41,42) ER then we prove
  (i) T(u1+42) = T(u1) + T(u2) -
 : Now
  T(u_1+u_2) = T((x_1,x_1)+(x_1,x_2))
         = T ( X1+31, X2+36)
              = ( (x1+31)2, (x1+32)2)
  T(u_i) + T(u_i) = T(\lambda_i, \lambda_i) + T(\lambda_i, \lambda_i)
                = (x_1^2, x_2^2) + (y_1^2, y_2^2)
                = (x_1^2 + y_1^2, x_2^2 + y_2^2)
     from 0 4 0
       T(u_1+u_2) \Rightarrow T(u_1)+T(u_2)
  Hence T is not a linear. transformation from R2 to R2
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(v) T: R3 - R3 defined by T(X1)X2,X3) = (X1,X1,X3) + (1,1,1)
 Sol: Given transformation is
   (|\epsilon|\epsilon|) + (\epsilon K_{\epsilon} \epsilon K_{\epsilon} K_{\epsilon}) = (\epsilon K_{\epsilon} \epsilon K_{\epsilon} K_{\epsilon}) T
   Lat U1 = (X11X2)X3)
, 4 U2 = (51, 41, 43) E R3 than we prome
I(i) T(U_1 + U_2) = T(U_1) + T(U_2)
      T(U1+U2) = T((X1,1K1)+(41,141))
                                              = T(X1+1X, 1X+1X, X3+13)
                                              = (x1+xx, xx+xx, xx+xx) + (1)1)1)
                                                 - (1+ct+ck , 1+ct+ck , 1+c+1K) =
        T(u_i) + T(u_i) = T(x_i, x_i, x_i) + T(u_i) + 
                                                         = (x1,x2)+(1,11)+(EXCEXCIX) =
                                                           = (X1+1, X2+1, X3+1) + (>1+1, Y2+1, Y2+1)
                                                         = (x1+51+2, x2+2+2, x3+32+2) ----(1)
          fan () 4 (2)
                 T(U1+U2) + T(U1)+T(U2)
       Hence T is not a linear transformation from R to R.
    Q3 Determine which of the following transformations
 (a) T: M22 - R defined by
 (i) T(\begin{bmatrix} a & b \\ c & d \end{bmatrix}) = \alpha + d
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Solo Giner transformation is T([2d]) = a+d



Let 
$$A_i = \begin{bmatrix} a_i & b_i \\ c_i & d_i \end{bmatrix}$$

$$A_2 = \begin{bmatrix} a_1 & b_2 \\ c_2 & d_2 \end{bmatrix} \in M_{22} \quad \text{then we prove}$$

(i) 
$$T(A_1+A_2) = T(A_1)+T(A_2)$$

$$T(A_1 + A_2) = T\left(\begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} + \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix}\right)$$

$$= T\left(\begin{bmatrix} a_1 + a_2 & b_1 + b_2 \\ c_1 + c_2 & d_1 + d_2 \end{bmatrix}\right)$$

from 
$$\mathbb{O} + \mathbb{O}$$
  
 $T(A_1 + A_2) = T(A_1) + T(A_2)$ 

$$T(\alpha A_i) = \alpha T(A_i)^{\alpha}$$

(ii) 
$$T: M_{22} \longrightarrow R$$
 defined by

$$T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = ad - bc$$
Self Giner transformation is

$$T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = cad - bc$$
Let  $A_1 = \begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix}$ 
then we prove

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$$T(A_1+A_2) = T(A_1) + T(A_2)$$

NA.

$$T(A_1+A_2) = T\left(\begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} + \begin{bmatrix} a_2 & b_2 \\ c_2 & d_1 \end{bmatrix}\right)$$

$$= T\left(\begin{bmatrix} a_1+a_2 & b_1+b_2 \\ c_1+c_2 & d_1+d_2 \end{bmatrix}\right)$$

Now

$$T(A_1)+T(A_2) = T\left(\begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix}\right) + T\left(\begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix}\right)$$

from 0.40

Hence T is a linear transformation from M22 to R.

(b) T: Pa(x) ----- Pa(x) defined by

(i) 
$$T(a+bx+cx^2) = a+(b+c)x+(2a-3b)x^2$$

Sel. Ginen transformation >

```
Les U = a + b x + c x2
   4 V = property & Pr(x) than we
 (i) T(u+v) = T(u) + T(v)
 T(U+V) = T((Q+bx+Cx2)+(p+yx+xx2))
         = T ( (a+b) + (b+ y) + (c+1)x2)
         = (a+b) + (b+q+C+1) x + (2a+2b-3b-34) x2
         = (a+b) + (b+c+++1) x + (2a-3b+2b-3q) x2
         = (a+(b+c)x+(2a-3b)x2) + (b+(9+1)x+(2p-34)x2)
         = T(a+bx+cx2) + T(b+vx+2x2)
         * T(u) +T(v)
(ii) Lot KER of U = a+bx + cx2 then we prome
  T(xu) = kT(u)
NAW
T(XU) = T(K(a+bx+cx2))
       = T (Ka+Kbx+Kcx2)
       = Ka+(Kb+Kc)x+(2Kd-3Kb)x2
       = K ( a + (b+c)x + (201-36)x2)
        = KT(a+bx+cx2)
          KT(U)
Hence T is a linear transformation from P2(x) to P2(x).
```

(ii)  $T: P_2(x) \longrightarrow P_2(x)$  defined by  $T(\alpha+bx+cx^2) = (\alpha+1)+bx+cx^2$ Soli Ginen transformation is  $T(\alpha+bx+cx^2) = (\alpha+1)+bx+cx^2$ Let  $U = \alpha+bx+cx^2$  $V = p+yx+xx^2 \in P_2(x)$  then we prove

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

Now

 $T(u+v) = T((\alpha+bx+cx^2) + (b+qx+cx^2))$ 
 $= T((\alpha+b) + (b+q)x + (c+x)x^2)$ 
 $= (\alpha+b+1) + (b+q)x + (c+x)x^2$ 
 $+$ 
 $T(u) + T(v) = T(\alpha+bx+cx^2) + T(b+qx+x^2)$ 

Franco & @ Special Control

T(U+V) & T(U) + T(V) > VAVV

Hence T is not a linear transformation from Pr(x) to Pr(x).

Q5: 99 A is an man matrix, show that T(x) = Ax is a linear transformation from R" to R" Available at www.mathcity.org

T(x) =

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} + y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} \in \mathbb{R}^n$$

then we prove T(x+y) = T(x) + T(y)

مت له

T(1+1) =

Available at www.mathcity.org