Composition of two linear functions is linear

F.D -> R

let g.P. -, D

Fog (x) = f (g(x))

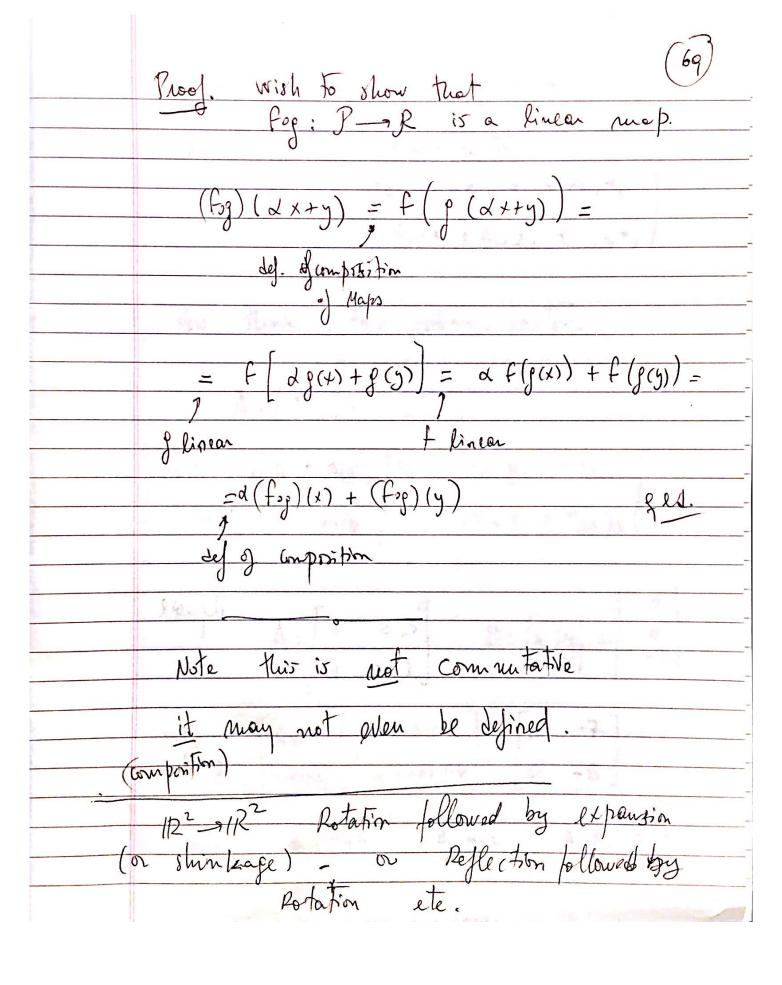
Fog: P-R

Example  $g[x_1] = \begin{bmatrix} x_1 + x_2 \\ x_1 - x_2 \end{bmatrix}$ 

g:1122 - 1123

 $f\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} y_1 + y_3 \\ y_2 - y_3 \\ y_4 - 2y_2 \end{bmatrix} \qquad f: \mathbb{R}^3 - 1/2^3$ 

 $F\left(g(\lambda)\right) = \begin{bmatrix} \chi_1 + 4\chi_2 \\ 3\chi_1 - 4\chi_2 \\ -\chi_1 + 3\chi_2 \end{bmatrix}$ 



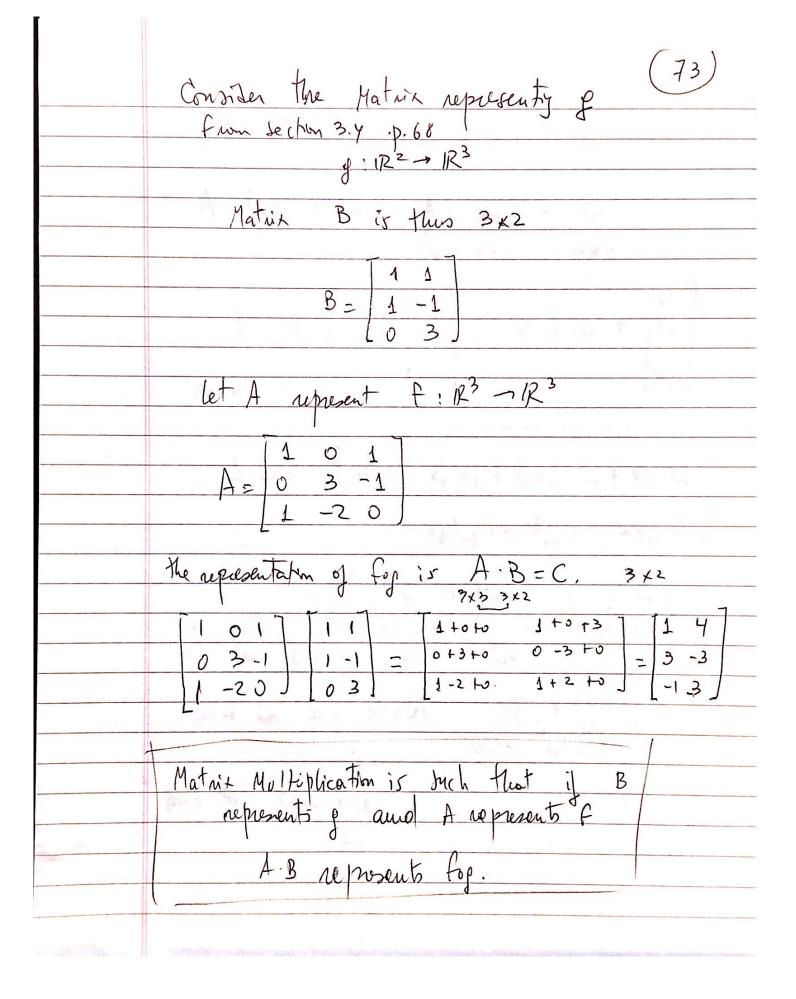
Section 3.5 Matrix Multiplication (70)
Recoll Matrix times vector
A.X = [a, x, +a, 2 x + a, 3 x]
Be1X, + a2, X2 + a23 x,
You flink of Two column vectors
A:[X y]=
911 X1 + 922 X2 + 923 X3 911 Y1 + 922 Y2 + 923 Y3
Q21 X1 + 922 X2 + Q23 /3   Q21 Y, + Q22 Y2 + Q23 73 ]
$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} x &  y  = 1 & 0 \\ 1 & -3 & 1 \end{bmatrix}$
$A \cdot B = \begin{bmatrix} 1+2+3 & 2+0+3\cdot(-3) \\ -1+0+1 & -2+0+1\cdot(-3) \end{bmatrix} = \begin{bmatrix} 6 & -7 \\ 0 & -5 \end{bmatrix}$
Note A 2x3 B 3x2 A.B. 2.2

72
So. each entry of A.B
V
is the "product of a now of A
0
with a colum of B
, 4 V.5
Cij = Aix · Brj
hother example B.A.
1121 1- 1- 1-2 2+0 3+1
10 123 = 1+3 2+0 3+0
1-3 (-101)
7.2 2 4 3
3×3
1-1 2 4

3x2 2x3 2 4 2 3 1

Note A·B + B.A

Matrix product is not



and the same of th	
	Aus Then view
	A has columns a, az an
	Ax1 Ax2 Axn
	MAT MAT MAI)
	[.   ] ] TV1]
	$A = \begin{bmatrix} a_1 & a_2 & \dots & a_n \end{bmatrix}  V \text{ vector } V = \begin{bmatrix} v_1 \\ v_2 \\ \dots \\ v_n \end{bmatrix}$
	min [ [xn]
	N
	A.V = \( \sum_{\text{i}} \var{\alpha}_1 = \var{\gamma}_1 \alpha_1 + \var{\gamma}_2 \alpha_2 = - \frac{1}{2} \var{\gamma}_1 \alpha_1 \\ \var{\gamma}_1 \rangle_1 + \var{\gamma}_2 \rangle_2 + \var{\gamma}_1 \rangle_1 \\ \var{\gamma}_1 \rangle_1 + \var{\gamma}_2 \rangle_2 + \var{\gamma}_1 \\ \var{\gamma}_1 \rangle_1 + \var{\gamma}_2 \\ \var{\gamma}_1 \\ \gamma
	ia
	VaAxy + V2 Ax2 + + Vn Axn
	Elements of the Vector are the colours of A.  Elements of the Vector are the coefficients  of the linear combhatin
	Elements of the vector are the coefficients
	of the linear combhatin
	Same on two vector A[X J]=[Ax A]]
	anxn nx2 mx2
	book to example

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ 1 & 0 \\ 1 & -3 \end{bmatrix}$$

$$A \cdot B = \begin{bmatrix} 1 \cdot \begin{bmatrix} 1 \\ -1 \end{bmatrix} + 1 \begin{bmatrix} 2 \\ 0 \end{bmatrix} + 1 \begin{bmatrix} 3 \\ 1 \end{bmatrix} \\ 2 \begin{bmatrix} 1 \\ -1 \end{bmatrix} + 0 \begin{bmatrix} 1 + (-3) \begin{bmatrix} 3 \\ 1 \end{bmatrix} \end{bmatrix}$$

$$= \begin{bmatrix} 6 & -7 \\ 0 & -5 \end{bmatrix}$$