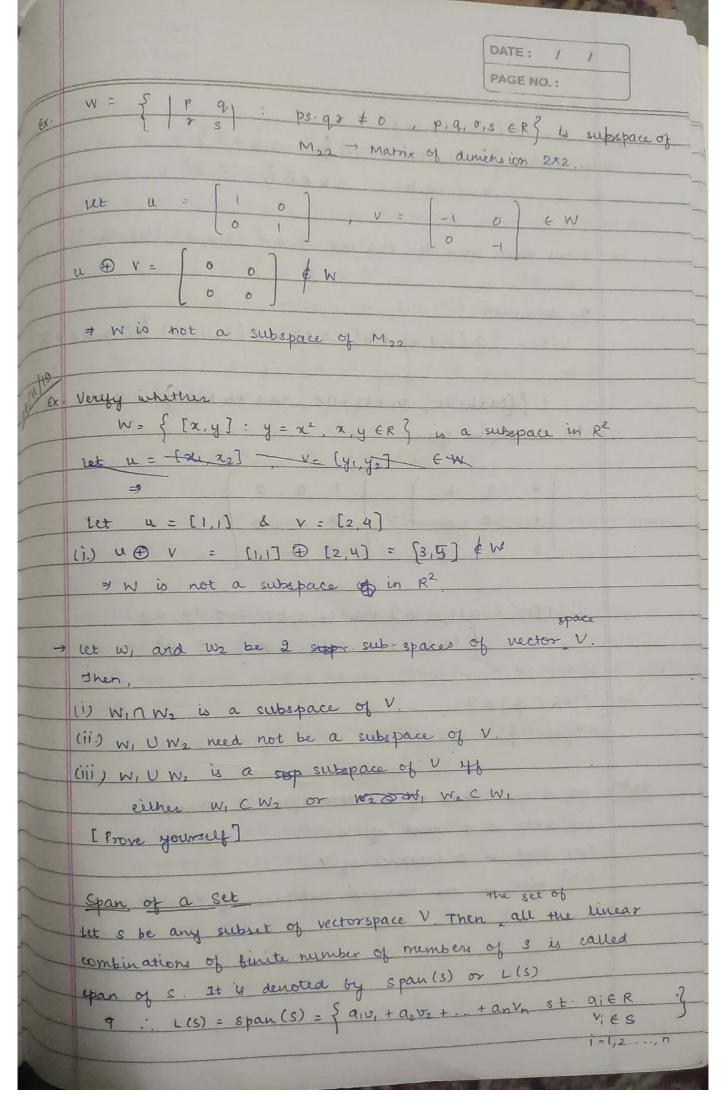
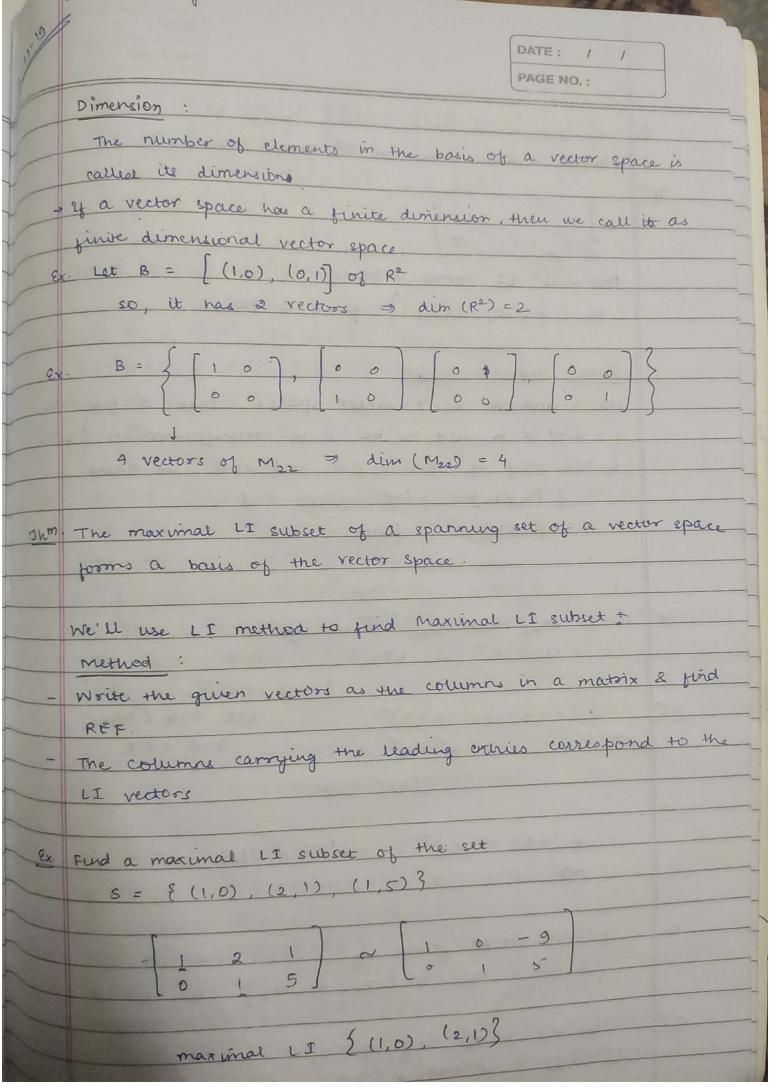
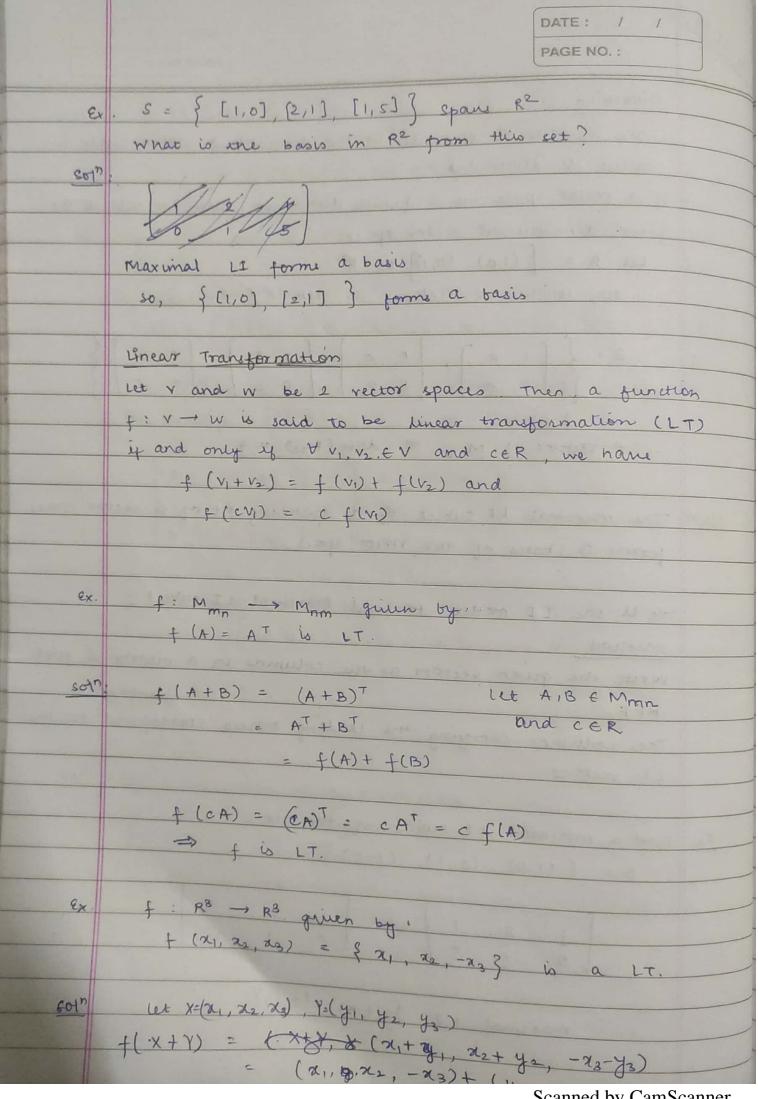


	a semal
	Study R1, R2 Rn -> n-dimensional DATE: / / PAGE NO.:
	Study PAGE NO.:
	Q. Prove / Disprove.
	sub-space: subset of space eatisfying all properties of that
	Sub-space: subset of space
7	Lapare Sit V is a vector space and W is a subset of V s.t. under the same operations as in V
	If v is a vector space and same operations as inv
	space
	and a subspace
çx.	The cet $W = \frac{1}{2} \left[x_1, 0 \right]$
4	WERZ, VERZ
	1.64 .00
TL m	: A subset W of a vector space V is a subspace of V iff vector vector and scalar multiplication, (and vice vector)
Jn	Wir closed not addition and scalar multiplication, (and vice verse)
-	
NOTE	: It is also easy to show that a subset W of a vector space V
NOTE	is a subspace of Viff
	aou B bov EW Y a, b ER and u, v EV
Ex-	Show that the set W = {[2,0], 21 eR} is subspace of R.
sel	Let u= [x1,0] v= [y1,0] u,v ew and a der
	Then
	u D v = [21+41,0] & W (by closer property) 7 agan
	$a \cdot u = a \cdot [x_1, 0] = [ax_1, 5] \in W$ Scalar multiplier
Man or	
	> W is closed under 2 of 2 vector add & scalar multip".
	Hence, w is a subspace in R2.
	and the first of the same of t
Ex.	Verify whether W = \$ 60 .7
	Verify whether W = \$ [2,4], n-y=0-, 2,4 eR 3 is a subspace in R2.
Solo	
	Let $u = [x_1, x_2]$ $V = [y_1, y_2] \in W$ and $a \in R$
	= 21-22=0 and y1-42=0
	112 4 - [2,+41 22+47
	$u \oplus v = [x_1 + y_1, x_2 + y_2] \in W [-(x_1 + y_1) - (x_2 + y_2) = 0]$
	aou= [ax, ax2] + w [: ax, -ax, -a(x,-x2) = 0]
1	= Wis a subspace in R2



DATE: / / PAGE NO .: Ex 5 = { (1,0), (0,1) } then L(s) = Sa(1,0) + b(0,1) }: a,b = R3 $= \{(a,b) : a,b \in \mathbb{R}^3 = \mathbb{R}^2$ Ex. show that span of the sex s = { [2,3,4], [1,5,7], [3,11,13]} is 1R3 L(S) = fa[2,3,4] + b[1,5,7] + c[3,11,13] 3: a,b,c eR? By definition. = { (2a+b+3c, 3a+5b+11c, 4a+7b+13c) : a,b,ceR} for simplified span · L(s) = a(1,0,0) + b (0,1,0) + c (0,0,1) = (a,b,c): $a,b,c\in\mathbb{R}$ $\equiv \mathbb{R}^3$ Er. Span () =? span (0) = { 03 Thm: Let s be subset of a vector space V. Then, (1) L(s) is a subset of v (11) L(s) is a subspace of V (111) L(S) is the minimal subspace of V containing S





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           = f(x) + f(y) ~
    f(cX) = \{cX_1, cX_2, -cX_3\}
          = c { 21, 22, -x33 = c f(X)
        of in LT.
                           Then
Ex let A be a morn matrix and f. Rn - Rm given by:
        f(x) = Ax is a LT.
win Let XI, X, E R" and a E R. Then,
    f(x_1 + x_2) = A(x_1 + x_2) = Ax_1 + Ax_2 = f(x_1) + f(x_2)
 f(\alpha x_1) = A(\alpha x_1) = a(Ax_1) = af(x_1)
         → fis a LT.
 Note: A LT f: V -> V is called a linear operator on V.
    Theorems:
 I. If L: V -> W is a LT and, then L(0) = 0
     and L (a1 V1 + a2 V2) = a1 L(V1) + a2 L(V2) + 4, a3 ER 6 V1, V2 EV
 Proof: Let uEV then
    -L(0) = L_{(u)} + (-u)_{(u)} = L(u) + L(-u)
                            = L(u) + (-1) L(u) = 0.
    - L (a1V, + a2V2) = L (a1V1) + L (a2V2)
                    = a1 L(V1) + a2 L(V2)
II. The composition of two LT is also a LT., ie,
     if L1: V1 -> V2 & L2: = V2 -> V3 are LT, then
      120L, ; V, -1 V3 is a LT
long: let u, v & V, and a & R
     Given: L1: V1-1 V2 & L2: V2-1 V3 are LT
    We have (L20L1) (u+v) = L2 [L, (u+v)]
           = L2 [ L1(U) + L1(V)] = L2[L1(U)] + L2[L1(V)]
                                  = L20L1(U) + L20L1(V)
```

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	(1201,)(au) = 1,[1,(au)] = 1,[al,(u)] = a 1,[1,(u)] = a 1,[1,(u)]
	→ Lool, is a LT.
III.	It I: V - W is a LT and VI & W, are subspace of
-	v and w. resp., then L (v) = {L(u): uel/2} is a subspace of w
	and $L^{-1}(W_1) = \{V : L(V) \in W_1\}$ is a subspace of V .
Proof:	ara (11)
	To prove:
	L(VI) = { L(V): V ∈ V1 } is a subspace of W
	Let L(u), L(v) & L(V1) and a & R.
	Then, u, v ∈ V, and we have
	L(W) + L(V) = L(U+V) + L(VI)
	ALLO, a L(u) = L(au) C L(VI)
1 11 11 11 11 11	au EVI = L(M) is a cubspace of W.
	The state of the
	11 22 4 500 7 2 3 COL-2 4 END \$ 2 3 TOLL .
-	to a study to the total of the
	County and