ISHAAN ROMIC
A (\$ 5 (6 A) A) F (A T) Page No.
ASSIGNMENT ->
al) On R°, define two properties: \$\overline{\pi} \varphi \varphi = \alpha - \bar{\bar{\bar{\bar{\bar{\bar{\pi}}}}} \text{and}} \\ c \overline{\pi} = -c \overline{\pi} . Which of the axioms for the vector \\ space are satisfied by (R°, \varphi, \varphi')?
state are estimated by (R. A.)
space we sauspen ag 12 / 0,
A rector space (or linear space) consists of the following
properties:
1. 0 pot F field F of scalars
2. a set V of objects, called victors
3. a rule (or operation), called vector addition, which
associates with each poir of vector & & in
a vector & + fin V, welled the rum of & and
B, in such a way that
(a) addition is commutative, &+F=B+&
(b) addition is associative, 2+(B-r)=(x+B)+r;
(c) I a unique vector O in V, rolled yero vector,
such that 40=4 FO VXEV;
(d) for each vector & in V, there is a unique vector
- w in V such that $\omega + (-\tilde{\omega}) = 0;$
4. a rule (or operation), called scalar multiplication,
which associates with each scalar in F and
vector & in V a vector && in V, called product of
c and a such that?
(a) 1 x = w 4 x E);
(0) (4,C2) Q = C1 (C2Q);
$(c) c(\alpha + \beta) = c\alpha + c\beta;$
(d)(c,+c,) x=c,x+c,x;

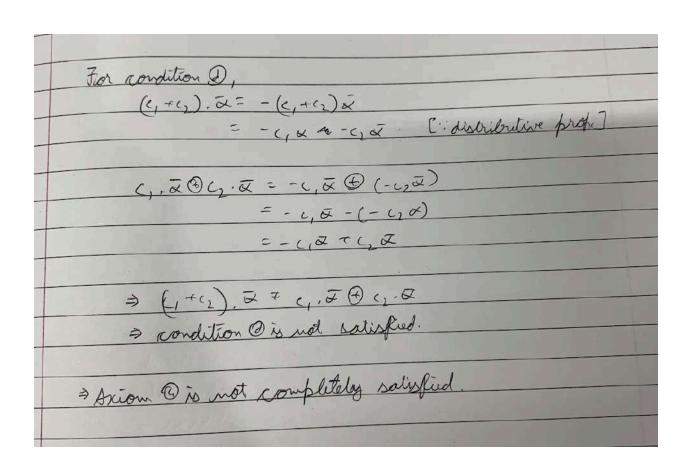
R" is a field of scalars

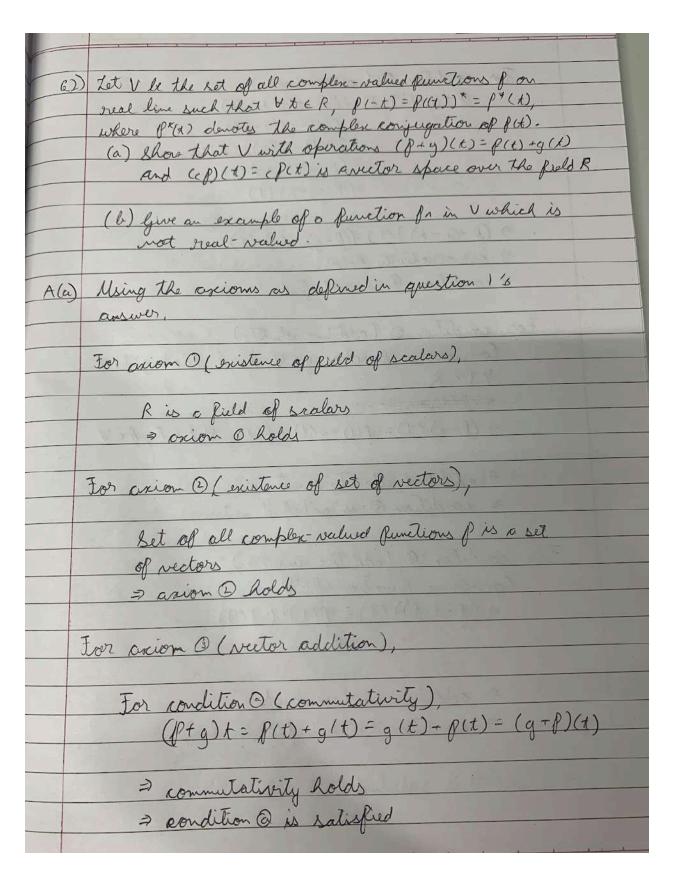
> property 1 tolds salisfied For property 0, > there exists a set of objects, called wectors in (R^, O,) # is satisfied For asion 3, For condition a, Z⊕B = Z-B = -(B-Z) =-夏田区 ⇒ 正图声 ≠ 声图·W > commitativity does not hold a condition @ is not satisfied For condition @, (= (= - p) - ~ = Q-B-~ \$ ₹ ⊕ (P ⊕ ₹) = = - (P-7) = Q-B+7

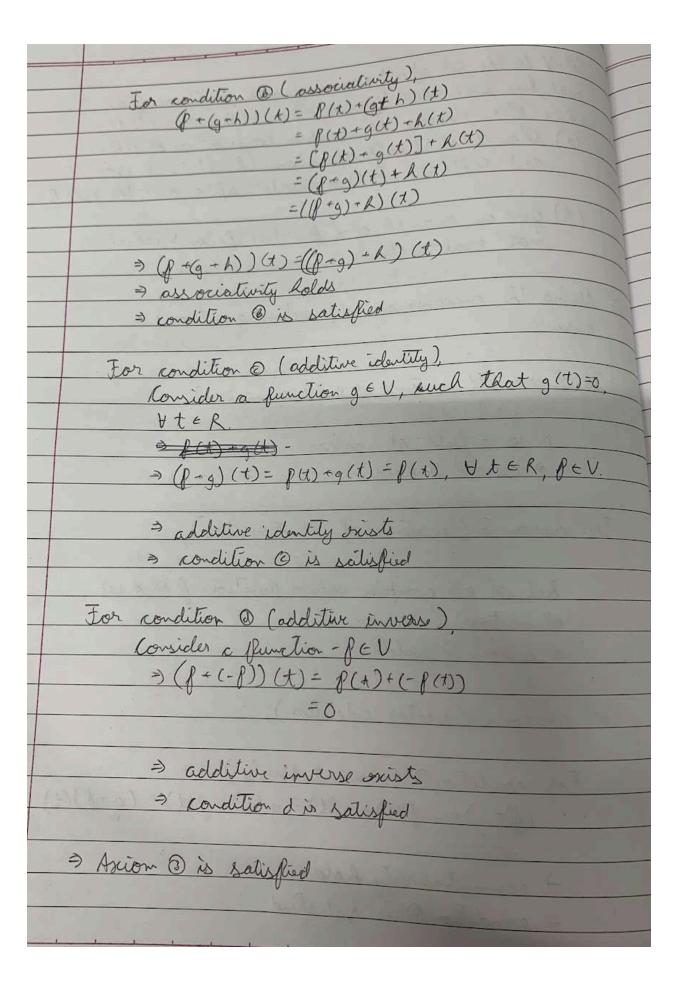
=) Z & (\$\varEP\) \ = (Z \D\) \ \ =) associativity does not hold > condition @ is not satisfied

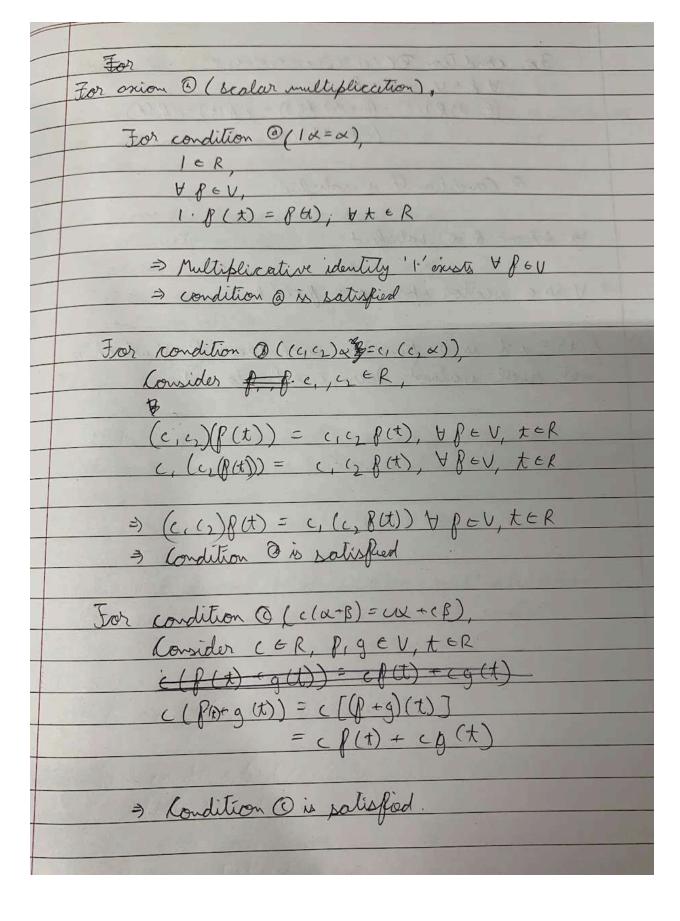
For condition @,
Z00 = Z-0 = Z
002=0-Z=8-2
→ AS & @ 0 + 0 @ x + &, additive identity
86'dols not exist
⇒ condition @ does not hold.
For condition O,
The second state of the second
As the additive identity 'o' does not oxist,
the additive inverse cannot exist.
> condition Dis not satisfied.
⇒ Axion @ is not salisfied.
The state of the s
For axiom B,
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
For condition 0,
$-1, \ \alpha = -(-1(\alpha))$
= &
The state of the s
⇒ The multiplicative identity '1' exists and is equal to
⇒ condition @ is satisfied.

For condition (1) (, (c, a) = c, (-u, a) = 440X (c,c),x = (c,c),x => C(.((1.4) = (1.62) a > commutativity does not hold = condition Dis not satisfied For condition @ c. (w@B) = c. (x-B) = -c(x-B) = - UX+CB (. × + C. B = - CX (C) = - cx - (-cp) = -64+68 => ((UOB) = C, WOC.B a) condition (holds.









<i></i>	
	For condition D((4 +(2) x = 4, x - c, x),
	HPEU, c, deR.
Г	((-d) g)(+) = ((+d) (4)) = (g(+) + of (+)
	=(cfrdf)(t)
	2 () = 0 : 1 0 - 1
	⇒ Condition @ is satisfied.
	ASAM OR OUNTED
	⇒ Axiom & is satisfied
	p+1 V - was the first on the Albert Com
	> V is a vector space over fixeld R
D(b)	R(t) = i t is a Runction such that P+V which is
	f(t) = i t is a function such that f + V which is not real-valued. Here, I refers to J-1.

63	Prove the Pollowing theorem:
	A non-empty ruleset W of vector space V is a subspace of V iff, for each pair of vectors a, BEW and each scalar c E F, the vector c a + F EW.
	of Viff, for each pair of vectors &, BEW and each
	scalar ce F, the nector ca + F EW.
A	To prove the theorem, we must prove
	i) the vector cx+B & Wif non-empty subset W of
-	rector space V is a subspace of V.
	ii) Non-empty subset w of vector space V is a
-	subspace of v if ex+ \beta & W
-	7-10
-	For O,
-	If W is a subspace of V, X, BEW, CEF, we
	know that vector addition exists in V and is closed
	generating vector bun'
	X-BEW, Wa, BEW
	We also known that scalar multiplication
TI B	exists in V generating a product vector
	CXGW, VXCW, CEF.
-	Deut ROLL Hay ROLLOGE
	=> cx+BeW, Va, BeW, ceF.

For O If W is a non-empty subset of V such that cox+ & ew, we can conclude that since the operations of addition and multiplication are the same for V and W, the properties of the operations are followed (ic. closure under addition and multiplication, commutativity under vector addition, associativity under vector addition distributivity of scalars in scatter multiplication, distributivity of vectors in scalar addition, & (2) = c, (c, o) We also know that since Wis non-empty, it contains at least one vector y EW, As cx+B=W, assuming c=-1, x=r, B=r, (-1) Y + Y € W 3 DEW ⇒ The additive identity exists. Assuming CEF, at W, X=V, B=O, ECYAGE + O EW 3 CJEW Further assuming C=-1, -1 (E) EW, TEW. =- YEW => the additive inverse is in W.