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HWOI TVM

Proof whether the following sets of form suspace

a). The set of vectors in the pollowing form 3(x, x, x,) y EP?: x,=x,

Let W= {(x,x,x,x,) \in PR' 1 x, = 2 x, y we need to show that

1). Let x = 0, x=0, x=0. So (0,0,0) & EW. to, vector 0

2). Let W. = (X11, X21, X31) and W2 = (X12, X22, X32).

If we add W. and W2. We get W. + W2 = (+11 + X12, X21 + X32,

X31 + X32). We know that x1 = 2 x3 and we can let x3 = x31 + x32,

X2 = X21 + x22, and x1 = 6 x11 + X12. So we get W. + w2 = (x1 + x2, x2)

where x1 = 2 x3, W1 + W2 = (2 x3, x2, x3). So, W1 + W2 is classed

under addition.

- 3). Suppose that we have $\alpha \in R$ and let $w = (x_1, x_2, x_3)$. [Five multiplied α and w. we get $\alpha w = \alpha (x_1, x_2, x_3) = (\alpha x_1, \alpha x_2, \alpha x_3)$.

 We can let $x_1 = \alpha x_1$, $x_2 = \alpha x_2$, and $x_3 = \alpha x_3$. In we get $\alpha w = (x_1, x_2, x_3)$. Since $x_1 = 2x_3$ and $\alpha w = (2x_3, x_1, x_3)$, thus condition implied that $\alpha w = \alpha x_3$ and $\alpha w = \alpha x_3$.

 Since all of three condition satisfied, the set of vector in form of $\alpha x_3 = \alpha x_3$.
- b). The set of vectors in the following form \$ (x,1x2,x3) } ER': x, : 3x2 +c,

 CER: any nonzero feal cortant.

1). Let 72 =0, x1 =0, x3 =0. Since x1 = 3.x2 +t and 0 ≠ 3.0 +t.

where tis constant. we can't have vector 0 on the subject.

2). Let $W_1 = (x_{11}, x_{21}, x_{31})$ and $W_2 = (x_{12}, x_{21}, x_{32})$. If we add w_1 and w_2 , we get $w_1 + w_2 = (x_{11} + x_{12}, x_{21} + x_{22}, x_{31} + x_{32})$. Since $x_1 = 3x_2 + 6$ and $x_{11} + x_{12} = 3(x_{21} + x_{22}) + 2C$, we know that those equation does not neet the given con dition $(x_1 = 3x_2 + C)$. So Thus, $w_1 + w_2$ is anot closed under addition.

Since two of three condition are not satisfied, the set operate does not

c). The set of all linear combination of rows of A. Let A be the so matrix nxm. A = / dz, dz, ...: Roblem 1: Recho some and sopelated :... : Unitedina die dien son son son est retter son We can dinote the rows of A by A, Az, ... An. Also, Let d, ,dz, ... dn to be the coefficient of linear combination. 1). Let every rows of A equal to (0,0,...o). so, the linear combination will be di(0,0,...0) + dz(0,0,...0) + ... + dn(0,0,...0) = (0,0,...0). Jet 188 188 Mar El Sin Sin 188 Mar 188 so So recetor o is in the subset on we have the subset of 2). Let v, w be the rector in A. since A is the ret of linear tourbination, Vector V and W are linear combination of A. Az, ... An, and exist Scalar Lidz, and ER and Bipz, Br. ER. We can write.

V= & 1 A 1 + dz Az + - + dn An = E Li Air some 3). Suppose that we induce of Ep and let we = (xindina). I pue W= BiAi + Bz Az + --- + BriAn = EBiAi boiling of then it with a so long, 15 2 by 131 100 ow V+W= EdiAi + & BiAi = \$ (2iAi + BiAi) = \$ (di+Bi) Ai though condition implied that is differ and politicalism Jo; the vector vew is also linear combination of vector An, Az, ... An, Jo, vew is closed under addition. [] 193 (2) 193 3). Let v be the vector in A. Dr and det CER. Since A in the set of linear combination and V is lengar combination of A, Az, ... An. Cell: and the feel feel. 1. (et 72:0) x1:0 x3:0:1Ai x0:2 = 3.x2 + c ond 0=30 + c. we multiplie vande 1000 sil 1000 su indusor 200 sont 3+ 5x 8 = x 97 112 (55x + 15x 55x + 15x 51x 121x) = 5W+ 190 + 190 3W, 5W 4000 noting 3000 took word on, 72 Eloc (kipi) 8: E (cdi) Ai 600 10 to meet the on (00 do from (4 = 3 xx + c). (2) The co. +W: ir so, vector ev is also linear combination of A, Az, ... An. so, or so civis closed under multiplications and sold sout sout sold : Since all of three condition ratified. The set form rubspace.

d) The ret of solution All politions	
J. Let x =0 we out D(0)	Axiables bus soul live sould as a find of the prince bus as a live of the prince bus a
FOT X = 0 isn't satisfied.	assume that b to so, the condition
21. Let XI and Vi Le us only	
TO THE JOIN	HONS. We get A (+, + ×2) = A x, + A x2
	6+4= (2 (0 2
5ince 24 11 11	= 26.
allihate to, the condition	irn't rahisfied. So x, + x2 is not closed under
oddition.	the coun convert to augmental madrix
3). Let x be a solution and c	a constant where CER.
No get $A(cx) = (Ax =$	cb. since cb \delta b, the condition isn't sutsfield
and is not closed under	multiplication.
Jince all of three condition is	not souts field. the set of all solutions to Ax=6
does not form as subspace.	7 7 7 90 to 10 1 5 1 5 F F
e). The set of différentiable fonction	1 5-59 0 5 1 5 1
Let w = {f:f'(x) is exist}.	Olet fand o
y. Let f and 9 Ew. There fore	0. 195-29 10 5 0 1 5
	d(f+9) = df + d9
	sats odr dr
Which meant that there conditio	n strong ir olored under addition.
21. Let FEW and CER is o	n constant. therfore:
	d(cf) = c. df
0 - 9 % + 1 %	dx odr o
which means that those condi:	tion is closed under multiplication
since both andition satisfied. The	set of differentiable functions form subspace.
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Problem 2: Null space and complete robusing to. Ax = 6.	
100 0 of 1000 od 1000 b con be com to 0 by	
Consider the set of linear equations $Ax = b$ with.	
[12] 27 benier [3] 0 2 3	
12 B 2 1 A = (5x + , +) AA = + d sel . Maddly wit, 36 = 2/10 is 191 (5	
[2 1 0 2]	
care Find the onth (iA) 2 of bonder in withdown of the de some	
We can convert to augmented matrix	
3). Let & be ontolution and continue where ces.	
beignille fini midisher of 182 11 321 (03) = (43) A tep out	
1 1 Wholdsilf and when bords for i has	
death of workers the fold the fold the fold of the fold of the fold of the fold	
Row-reduce to RREF	
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eb, 3 b = (e+3) b	
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R3 × -1 0 3 2 2 10 1 R3-3R2 (030 2 -110)	
36 3 - (33)6	
R3*1/2 1 0 1 0 10 10 1 × 1 + + 3 = 0	
- 0-15-0 0 - =7 1×2 + +4 =0 1000	
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=> ×1 = - ×3 => ×1 = - 1/2 ×4	
×2 = -×4	
×3 = 1/2×4 ×3 = 1/2×4	
X1 -1/2 X4 -1/2	
* x2 = -x4 = -1 x4	
1/2 ×4 1/2	
X4 X4 L 1 =7 × n = -1 XA	
1 1/2	
Busis	

b. Find the particular solution to Ax = b.

We can convert to augmented matrix

Pour Reduce to RREF

$$\begin{bmatrix}
1 & 2 & 1 & 2 & 3 & R_2 - R_1 & 1 & 2 & 1 & 2 & 3 \\
1 & 1 & 1 & 1 & 2 & --> & 0 & -1 & 0 & -1 & -1 \\
2 & 1 & 0 & 2 & 3 & R_3 - 2R_1 & 0 & -3 & -2 & -2 & 1 -3
\end{bmatrix}$$

Let
$$\times q$$
 (Free variable) equal to 0

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