(3) Find a linear transformation $T: \mathbb{R}^3 \longrightarrow \mathbb{R}^3$ such that the set of all vectors satisfying $4x_1 - 3x_2 + x_3 = 0$ is – (i) the null-space of T. (ii) the range of T.

Nimay pointed this out correct in class,

(i) Given the null space, find the vectors not in null space but choose them onthogonally. Why?

But still, for the salke of mathematical signur, you are regd to do what I was forjing to explain.

4x1-3x2+x3=0: plane in 12: dim=2

B= { (3,4,0), (0,43)}

Extend this basis to R³, consider the normal to the plane (4,-3,1)

BB= { (3,4,0), (0,1,3), (4,3,1)}

Now if I know values that Av takes for VEBR3 then I can uniquely determine A

I can uniquely determine A

Say $Av_1 = w_1$ $Av_2 = w_2$ = $Av_1 Av_2 Av_3$ = $[w_1 w_2 w_3]$ $Av_3 = w_3$ = $A[v_1 v_2 v_3]$

A=[V1 V2 V2] [W1 W2 W2]

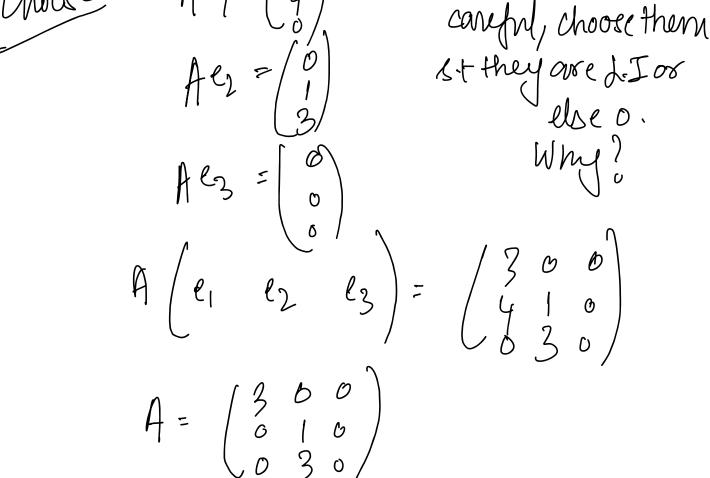
Cinco (3) (0) is well conce

$$A = \begin{cases} 3 & 4 & 4 \\ 1 & 3 \\ 2 & 4 \\ 3 & 4 \\ 2 & 3 \\ 2 & 4 \\ 2 & 3 \\ 2 & 4 \\ 2$$

vector set of the given space and use them as the column of your transformation matrix.

Consider Bop3 = (c1/6/63)

Choose Au fertes but



Again exactly what was pointed out.

(4) Let $\mathcal{P}[x]$ denote the space of all real polynomials in one variable. Let

$$V = \{ p(x) \in \mathcal{P}[x] : p(0) = 0 \}.$$

Prove that taking the derivative defines a one-to-one linear transformation from $D:V\longrightarrow \mathcal{P}$ and $D^{-1}(p)(x)=\int_0^x p(t)\,dt$.

 $p(x) \in V \rightarrow P$ $p(x) = p(0) = 0 \Rightarrow p(x) = constant \ \forall x \in V$ $p(x) = p(0) = 0 \Rightarrow p(0)$

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fundamenta min of continuous million ((1)) det fle a continuous real valued function on a dosed interval [a,b]. Let Fbethef ndefined txefa,6] by FEX)= (x) Flt) dt Then F(x)=f(x) &xE(91b) $1 D^{-1}(p)(x) = \int_0^x p(t) dt$. consider F(x) = \ p(t)dt =) F(x) = p(x) D(F(x)) = P(x) P(x) = D'(p(x)) = [pftdt