

#ref #disorganized #incomplete #hw

1 | Problem 12!

title: the problem

Supposed V is finite-dimensional with $\dim V > 0$ and suppose W is infinite-dimensional. Prove that

the set of all linear maps.. which are just a bunch of transformations like matrices.

we can do.. proof by ~induction?

ie. prove that we can do $T(a_1, a_2, \dots, a_n) = (a_1, a_2, \dots, a_n, 1)$ and therefore, we can extend it to infin and prove that it works

to do so, we need to prove that each linear map is: - associative - homogeneity

no! instead, we can do: $T(a_1, a_1, \dots, a_n) = (a_1, a_2, \dots, 1_j, a_n, 0_1, 0_2, \dots, 0_\infty)$

essentially, have an inf len list of zeroes at the end, then set the first index to 1, then the next, then the next, ect.

OR!

we can show that an inf len transformation works, and prove that therefore the whole thing needs to be inf len.

inf dimensional:

if there is no spanning set

len list LID \leq len span list

prove that every new vec is linearly independent inf list of LID lists

2.15: def inf dimensional 2.10: finite dimensional 2.23: len of LID list \leq len spanning list 2.17: linearly independentdefine a transformation - prove inf dimensional - prove not finite dimensional - prove that there isnt a spanning list - len LID \leq len spanning list, inf len LID list means no spanning list - thus, we can say it's inf dimensional $\square((\square \neq) \rightarrow \square)$ for all b exceptif where $b_k = a_1$ andall $b = 0$, $b_k = 0$, for all b_j , $b = 0$. if k , $b = a_1$ all b except $b_k = 0$. $b_k = a_1$

$$\forall b \mid b \in (b_1, b_2, \dots) \square b \neq b_k, b = 0. b_k = a_1$$

 $b_j = 0$ if $j = k$, $b_j = a_1$

$$\{ \{ b_1, b_2, b_3, \dots \mid b_i = \begin{cases} 0 & \text{if } i \neq k \\ a_1 & \text{if } i = k \end{cases} \} \mid b_j = \begin{cases} a_1 & \text{if } j = k \\ 0 & \text{otherwise} \end{cases} \}$$