#flo #ref

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1 | Spans

concept introduced in KBxChapter2AReading

notes, on as explained by professor dave.

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title: review: subspace
a vector space contained inside another vector space

eg. S is a subspace of V
that means every element in S is also in V

which means, the only things we need to check that arn't inhereited from the paret space are:
- if S is closed
    - a in S, then ca is in S // closed under scalar multiplication
    - a in S, b in s, then a+b in S // closed under addition
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1. checking a subspace eg. subspace: R^3 S = [x, 0, -x] multiply by c: [cx, 0, -cx], still in the same form. add another vector: [x, 0, -x] + [y, 0, -y] = [x+y, 0, -(x+y)] still in the same form so it's closed under addition and SCAMUL! therefore it's a subspace

1.0.1 | defining the span

$\vec{v}_1, \vec{v}_2, ...\vec{v}_N$ in V

sum of these elements multiplied by some scalars: $a_1\vec{v}_1 + a_2\vec{v}_2 + ...a_n\vec{v}_N$

is called a **linear combination**

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the set of all linear combinatins is called the span
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eg.

$\vec{v}_1 = \begin{bmatrix} 2 \\ 1 \\ -1 \end{bmatrix}$, $\vec{v}_2 = \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix}$, $\vec{v}_3 = \begin{bmatrix} -1 \\ -1 \\ -1 \end{bmatrix}$

span($\vec{v_1}, \vec{v_2}, \vec{v_3}$) = $\begin{bmatrix} 2a \\ a \\ -a \end{bmatrix}$ + $\begin{bmatrix} 0 \\ 2b \\ 2b \end{bmatrix}$ + $\begin{bmatrix} -c \\ -c \\ -c \end{bmatrix}$ = $\begin{bmatrix} 2a & +0 & -c \\ a & +2b & -c \\ -a & +2b & -c \end{bmatrix}$

the span of any number of elements of vector space V is also a subspace of V actully, it is the *smallest subspace* of V that contains the set of elements that you ran the span on it is the intersection of all subspaces that contain them? **span: important for describing vector spaces**