

#flo #hw

1 | Finite-Dimensional Vector Spaces

title: Review

F denotes \mathbb{R} or \mathbb{C} V denotes a $[[\text{file:KBe20math530refVectorSpace.org}][\text{KBe20math530refVectorSpace}]]$ over F

- lin alg does not focus on arbitrary vector spaces
- it focuses on finite-dimensional vector spaces!

title: learning objectives for the chapter

- span
- linear independence
- bases
- dimension

- notation:

- lists of vectors:
 - * $(2,1,4), (3,2,5)$
 - list len 2 of vectors in \mathbb{R}^3
 - * n-tuples without surrounding parens

- *linear combination*

- a linear combination of x and y would be any expression of the form $ax + by$, where a and b are constants ~wiki
- multiply each element in a list of vectors by an element in F
- and then add them up!
- any relation between the element scalar and what's being multiplied? can the scalars repeat? #question

- *span*

- the set of all linear combos of a list of vectors
 - * denoted: $\text{span}(v_1, \dots, v_m)$
- span of empty list is $\{0\}$
- aka. linear span

the span of a list of vectors in V is the smallest subspace of V containing all the vectors in the list

```ad-question

but don't you get out a single vector at the end..? because you add them? #question no! because it's the

- *\*finite-dimensional vector space*
  - a vector space is called finite-dimensional if some list of vectors in it spans the space

\* ??

- linear independence
  - a list of vectors in  $V$  where the only choice of  $a_1 \dots a_m$  in  $F$  that makes  $a_1 v_1 + \dots + a_m v_m = 0$  is  $a_1 = \dots = a_m = 0$
  - unique way to get 0?
- linearly dependent
  - opposite, can get to 0 with non-zero scalars