Source: [[KBe20math530refVectorSpace]]

#source Axler2.A

1 | #definition span

The set of all linear combinations of a list of vectors $v_1, ..., v_m$ in V is called the span of $v_1, ..., v_m$, denoted span$(v_1, ..., v_m)$:

$$\text{span}(v_1, ..., v_m) = a_1 v_1 + ... + a_m v_m | a_1, ..., a_m \in F$$

And the span of an empty list $()$ is 0 - This is just to make Axler2.C work out nicely ([[KBeRefLinAlgDimension]])

2 | Properties

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

2.1 | #definition spans

If span$(v_1, ..., v_m) = V$, then $v_1, ..., v_m$ ***spans*** V

3 | Examples

3.1 | Axler 2.9

Suppose n is a positive integer. Show that $(1, 0, ..., 0), (0, 1, 0, ..., 0), ..., (0, ..., 0, 1)$ spans F^n. - Basically, if a list of vectors spans a vector space then linear combinations of those vectors (almost like colloquial polynomials of those vectors) can form each vector in the space. - In this case, the vector space F^n is a list of vectors in F, and having the 1 in each slot is enough to, when scalar multiplied with $a \in F$, get all possibilities of F^n. - I need to wrap my head around this some more.
