Source: 2020MATH530/KBe2020math530index.md

#source Axler "Linear Algebra Done Right" chapter 2.B

#flo #ref #disorganized #incomplete

1 | Bases

1.1 | Summary

If it spans, and it's linearly independent, it's a basis!

1.2 | Axler2.27 #definition basis

> A *basis* of V is a list of vectors in V that is linearly independent and spans V. - Basically a linearly independent spanning list, or the "minimum" amount of information contained in a vector space

1.2.1 | Other Results

- Axler2.29 "criterion for a basis"
  - A list is a basis if and only if each vector in V can be written as exactly one linear combination of the list
- Axler2.31 all spanning lists contain a basis
  - Intuitive. A spanning list might not be linearly independent, but some subset of it must be.
- Axler2.32 Any finite dimensional vector space has a basis
  - Intuitive. It has a spanning list
  - Also, no infinite dimensional vector space has a basis, by definition
- Axler2.33 Linearly indepedent lists can be extended to a basis
  - Intuitive. Do this by adding in vectors that "bring new information"
- Axler2.34 Every subspace of V is part of a direct sum of V
  - Intuitive. Kind of like saying there's an additive complement to every subspace of V
  - Any vector space can be thought of the span of it's basis. Because V has a basis, and one of U's basises can be written as a subsequence of V's basis, that basis can be expanded and the expanded elements spanned to form the complement vecspace.