

**Source:** 2020MATH530/KBe2020math530floIndex.md

#flo #disorganized #incomplete

## 1 | Administrative bits

- Will present problems from 2.B and/or 2.C next week
- Mini quiz, stop yourself after an hour
- and give your subconscious a chance to think about things
- **No need to say “clearly”, “obviously”, “evidently”**

## 2 | #icr Axler2.C

#source Axler Linear Algebra Done Right 2.C ## Polynomials are vectors - because you can add and scale them and they are kind of nice in general

### 2.1 | The box under 2.38

- You can't understand a vector space just by knowing the vectors inside
  - you also need to know the field that you are in
  - See 2.A ex5
- The field that you are over changes your dimension: usually we think of  $\mathbb{C}$  as a vector space over  $\mathbb{R}$ , but in this class we think of it as over  $\mathbb{C}$ , which means  $\dim \mathbb{C} = 1$

### 2.2 | Axler2.41

- It's my question! See [KBe20math530floQuestions](#)

### 2.3 | Axler2.42

- #tip If it's a spanning list that's the right length, then it's a basis and therefore linearly independent.
- If it's a linearly independent list and it's the right length, then it's a basis and therefore spanning.

### 2.4 | Axler2.43 Dimension of a Sum

#### 2.4.1 | An Example

- If you have two planes in 3 space, and they intersect at exactly one line, then you can't just add the dimension of the two planes ( $2+2 = 4$  which is more than 3 space can allow).
  - If the planes are parallel, and both subspaces, then we know they both go through the origin and thus are the same plane.

#### 2.4.2 | Some tips

- Usually easiest to get a basis of a subspace by building on instead of taking out
  - for example if you have a slanty plane in 3 space, and you start with standard basis, then you won't even get the slanty plane.

2.4.3 | **The span is  $U_1 + U_2$** 

- Because it's a double containment
    - $\text{span} \subset U_1 + U_2$
    - $v \in \text{span} \implies v = a_1 u_1 + \dots + a_m b_m + b_1 v_1 + \dots$
    - For all  $u.$  in the span, you can write it as something in  $U_1$  + something in  $U_2$
-