#flo #inclass

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1 | Let's review

inclass notes on KBxChapter3DReading

1.0.1 | singularity

non-singular has in inverse! it is not, singular.

lots of things are equivalent to invertibility, like

- systems of equations,
- determinants (they do exists, axler!)
  - |A| != 0
- ect.

$Ax = b$ has only one solution $\leftrightarrow$ A is nonsingular $\leftrightarrow$ A has an inverse $\leftrightarrow |A| \neq 0 \rightarrow nullA = 0$

- inverse of a matrix, pulls from ofc inverse of multiplication
  - cus 1/x is the multiplicative inverse
- invertibility is equal to bijectivity!
  - the proof:
    - assume invertible, show injective and surjective
      - use the inverse to make things equivalent
      - prove injective and surjective
    - other direction,
      - defines two identity maps, proves linearity
- #question : does bijectivity imply linearity? it should..
  - because, bijectivity means invertibility.. prove this later?
  - supposedly it's an iff? no..
  - NO! this is **WRONG**! smh. just make a peicewise function.

1.0.2 | isomorphism!

#extract

- strong, but not quite as strong as equal
  - not equal, cus can be diffs in formatting, but they *function* the same way > practically equal

#question is a vec space isomorphic to itself? ~nina yes, just follow the def!

- isomprhism is a superset of equal
  - any equal vec space is isomorphic, but isomorphic doesnt nessasarily mean equal

1. isomorphism relations

   all we care about is whether they have the same dimension

   same dimension only shows that vec spaces are isomorphic if they are over the *same* field. otherwise, we don't know.
   $L(V,W)$ and $F^{m,n}$ are isomorphic the zero in $M(T) = 0$ is the zero matrix, so an m*n matrix full of zzeerohws.

1.0.3 | operators

- can be injective but not surjective and vise versa
  - on inf dim vec space?
- BUT! on finite dim vec spaces, either injectivity or surjectivity is enough.
- we already showed that bijective means invertible, now we only need one, and we can show that they are all equal

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title: nullity
dimension of the null space
eg. "nullity of zero"
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- remember, 0 is not linearly independent! little bit wack
  - can take lots of non-trivial combos of 0 to get zero
- injectivity and sujectivity behave diff on operators

1.0.4 | wrapping up

we are not doing proof presentations, we are gonna work in small groups. and we get to choose!
we should mostly be prepping for the **3 hour exam all of next week!**
and make sure that we posted our proof presentations to the discussion page