Math 390 Monday February 22

Tue - Regular
Jordan Canonical
Form

Fri - BYOB Movies

SCLA 3.2 Nilpotent Linear Transformations

Defn $T: V \to V$ is **nilpotent** w/ index p if

(square matrices)

$T^p(\underset{\sim}{v}) = \underset{\sim}{0}$ for all $\underset{\sim}{v} \in V$. (matrices: $A^p = \emptyset$)

$T(T(T(\cdots))) = T^p(\;)$

Thm T nilpotent $\Rightarrow$ any eigenvalue of T is $\lambda = 0$.

Proof $\underset{\sim}{x}$ eigenvector of T for λ. $(T(\underset{\sim}{x}) = \lambda \underset{\sim}{x})$

then $\underset{\sim}{0} = T^p(\underset{\sim}{x}) = \lambda^p \underset{\sim}{x} \Rightarrow \lambda^p = 0 \Rightarrow \lambda = 0$

$\underset{\sim}{x} \neq \underset{\sim}{0}$

Theorem EPM
Eigenvalues of Polynomial of a Matrix

Theorem 3.2.5

$T: V \to V$ nilpotent.

T diagonalizable $\iff$ T is the zero linear transformation.

$(T(\underset{\sim}{v}) = \underset{\sim}{0}$ for all $\underset{\sim}{v} \in V)$

basis w/ diagonal representation

Review / Recap

Feb 11: A is similar to B, $AS = SB$

$\boxed{\text{SAME AS}}$

$T(\underset{\sim}{x}) = A\underset{\sim}{x}$ find a basis of $\mathbb{C}^n$, C, so

$$M^T_{C,C} = B$$

Finding S-matrix of similarity is finding a basis to provide a matrix representation

Chapter E (FCLA): Eigenvalues are hard. Everything else is easy.

See worksheet "CP-class"