① Find 3×3 matrices A, B, C having only $\lambda = 2$ for eigenvalue s.t

1) For A, $\dim E_\lambda = 3$. What is $\dim K_\lambda$?

2) For B, $\dim E_\lambda = 2$. What is $\dim K_\lambda$?

3) For C, $\dim E_\lambda = 1$. What is $\dim K_\lambda$?

Are A, B, C diagonalizable?

② Let $\alpha : V \to V$ be a linear transformation. $v \in V$. then $W = \text{span}\{\alpha^i(v) \quad i \geq 0\}$ is a invariant and it is the intersection of all invariant subspaces containing v

③ Suppose $\dim V = n$; we say that $\alpha \in \mathcal{L}(V)$ is nilpotent if there is k s.t $\alpha^k = 0$.

The smallest such k is called the index of nilpotence of k. If α is nilpotent with index k there is w in V s.t $W = \text{span}\{\alpha^i(w) \mid 0 \leq i \leq k-1\}$ has dimension k.

$(T-\lambda I)^{p-1}x$, $(T-\lambda I)^{p-2}x$, ... $(T-\lambda I)x$, x is called a cycle of generalized eigenvectors of λ.
Prove that K_λ has a basis consisting of a union of disjoint cycles of generalized eigenvectors of λ.

$\alpha \quad V \to V \quad \dim V = n \quad \alpha$ nilpotent with index K

There are numbers $K = k_1 \cdots \geq k_t$ with $n = k_1 + \cdots + k_t$

and vectors $v_1 \cdots v_t$ s.t

$\{v_1, \alpha v_1 \cdots \alpha^{k_1} v_1, v_2 \, \alpha v_2 \cdots \alpha^{k_2} v_2 \cdots\}$ is a basis for V

Find the Jordan Canonical form of :

Let $\dim V < +\infty$ $\qquad \alpha \; V \to V$

$\qquad\qquad\qquad\qquad\qquad \beta \; V \to V$

~~be~~ nihilpotent

if $T_B^B(\alpha)$ end $T_B^B(\beta)$ ere similer

must the index of nilpotency for α end β be the

seme ?

Look at diff eq book definition of e^A

Eigenvalues / vector of stochastic matrices