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LA- QUIZ

(1.) $A = \begin{bmatrix} 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix}$

Here, $|A-\lambda I| = \begin{vmatrix} -\lambda & 0 & 0 & 0 & 1 \\ 0 & -\lambda & 0 & 1 & 0 \\ 0 & 0 & 1-\lambda & 0 & 0 \\ 0 & 1 & 0 & -\lambda & 0 \\ 1 & 0 & 0 & 0 & -\lambda \end{vmatrix}$

$$= -\lambda^5 + \lambda^4 + 2\lambda^3 - 2\lambda^2 - \lambda + 1$$
$$= -(\lambda-1)(\lambda^4 - 2\lambda^2 + 1).$$
$$= -(\lambda-1)((\lambda^2-1)^2)$$
$$= -(\lambda-1)(\lambda-1)^2(\lambda+1)^2$$
$$= (\lambda-1)^3(\lambda+1)^2 = 0.$$

The eigen values are 1 (3 algeb mult)
-1 (2 - alg. mult)

The minimal polynomial is $(x-1)(x+1)=0$
$x^2-1=0$

It is diagonalisable

② $A \in M_3(C) \to$ Hermitian. $A^* = A \Rightarrow \bar{A}^T = A$.

~~det(A)=1~~. Eigen values are 1, 1, 3.

Char. Eqⁿ is. $(x-1)^2(x-3)=0$.

$(x^2-2x+1)(x-3)=0$.

What is B?

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(3) $A \in \mathbb{M}_2(\mathbb{R})$. $tr(A) = 1$. $det(A) = 1$.

let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ $a + d = 1$.

$ad - bc = 1$.

So, we can write the ~~chatd~~ characteristic eq^n as $x^2 - x + 1 = 0$.

from Cahley Hamilton Theorem.

$A^2 - A + 1 = 0$.

$\Rightarrow A^2 - A + I = 0$.

$\Rightarrow A^2 = A - I$.

$\Rightarrow A^{-1} A^2 = A^{-1}(A - I)$

$\Rightarrow A = I - A^{-1}$

$\Rightarrow A^{-1} = I - A$

$= \overline{\overline{P(A)}}$ a polynomial of degree 1.

(4) $A \in \mathbb{M}_2(\mathbb{C})$. $(2+i) \rightarrow$ eigenvalue of A.

~~if $(2+i)$ is a root of~~ characterist

$\therefore$ it has complex eigenvalues

it is not diagonalizable.