* Tra A of idempotent Matrix is real No.

* if $A = \begin{bmatrix} A_1 & 0 & \cdots & 0 \\ 0 & A_2 & \cdots & 0 \\ 0 & 0 & A_3 \cdots & 0 \\ \vdots & \vdots & \vdots & A_k \end{bmatrix}_{n \times n}$ is a block diagon Matrix

then (i) $C_A(x) = \prod C_{A_i}(x)$

Most

$$\boxed{\text{(ii)} \quad m_A(x) = \text{l.c.m.} \{ m_{A_1}(x), m_{A_2}(x), \ldots m_{A_k}(x) \}}$$

eg:

$$\begin{bmatrix} \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} & \begin{matrix} 0 & 0 \\ 0 & 0 \end{matrix} \\ \begin{matrix} 0 & 0 \\ 0 & 0 \end{matrix} & \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \end{bmatrix}$$

$C_{A_1}(x) = (x-1)^2$

$C_{A_2}(x) = x^2+1$

$$C_A(x) = \prod_{i=1}^{2} C_{A_i}(x) = (x-1)^2(x^2+1)$$

$$A_2 = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

$|A| = +1$ Trace $= 0$ $x^2 - 0 \cdot x + 1 = x^2+1$

$$m_A(x) = \text{l.c.m.} \{ m_{A_1}(x), m_{A_2}(x) \}$$

$$= \text{l.c.m} \{ (x-1)^2, x^2+1 \}$$

$$= \text{l.c.m} \{ (x-1)^2, \cancel{x+1}, x^2+1 \}$$

$$= \text{l.c.m} \{ (x-1)^2 (x^2+1) \}$$

$$= (x-1)^2 (x^2+1)$$