E3.10)

$$A = \begin{pmatrix} 2 & 3 \\ 4 & \alpha \end{pmatrix}$$

$= \det(A) \neq 0$

$$\det(A) = \det\begin{pmatrix} 2 & 3 \\ 4 & \alpha \end{pmatrix}$$
$$= 2\alpha - 12$$

to be invertible,

A is $\in \mathbb{R}^{n \times n}$ and $\det(A) \neq 0$

$2\alpha - 12 \,!= 0$

$\alpha = 6$ $\therefore$ for all x such that $x \in \mathbb{R}$: $x \neq 6$.

$$A = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} \qquad IA = A$$

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

$$\begin{array}{c} R_1 \\ R_2 \end{array} \left(\begin{array}{cc|cc} 1 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{array}\right)$$

$$\underset{\sim}{R_2 \to R_2 - R_1} \left(\begin{array}{cc|cc} 1 & 1 & 1 & 0 \\ 0 & 1 & -1 & 1 \end{array}\right)$$

$$\underset{\sim}{R_1 \to R_1 - R_2} \left(\begin{array}{cc|cc} 1 & 0 & 2 & -1 \\ 0 & 1 & -1 & 1 \end{array}\right).$$

$$\therefore A^{-1} = \underline{\underline{\begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}}}.$$

$$\begin{pmatrix} 1 & 3 \\ -1 & -2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$$= x\begin{pmatrix} 1 \\ -1 \end{pmatrix} + y\begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

$$x + 3y = 1 \quad — (1)$$

$$-x - 2y = 2. \quad — (2).$$

$(1) + (2)$

$$y = 3.$$

$$\therefore x = 1 - 3y = 1 - 9$$

$$= \underline{\underline{-8}}$$

An adjugate matrix is essentially
$\left(\sum \text{sign} * \text{minor.} \right)^T$.

let matrix A be $\in \mathbb{R}^{n \times n}$.

TBP: $|adj(A)| = (|A|)^{n-1}$

$$|adj(A)| = (|A|)^{n-1}$$

$$|A||adj(A)| = (|A|)^n.$$

if $|A| = 0$, then

~~LHS~~ LHS $\neq$ RHS.

But it is impossible
since A is an
invertible $n \times n$.

$$\therefore |adj(A)| = (|A|)^{n-1}$$