$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

GET $A^{-1}$ → SOLVE

BY GAUSSIAN ELIM.

$Ax_1 = e_1$, $Ax_2 = e_2$

$e_1$ & $e_2$ ARE COLS OF $2 \times 2$ ID MATRIX

$$\begin{bmatrix} a & b & | & 1 & 0 \\ c & d & | & 0 & 1 \end{bmatrix} \xrightarrow{\cdot 1/a} \cdots \rightarrow \begin{bmatrix} 1 & b/a & | & 1/a & 0 \\ c & d & | & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} x & w \\ y & z \end{bmatrix}$$

$e_1 = [x \; y]^T$

$e_2 = [w \; z]^T$

YOU CAN COMPUTE BOTH AT THE SAME TIME BY LOOKING AT $[A \mid I]$

SHOW $A^{-1}$ EXISTS IFF $\det(A) \neq 0$ (LAST)

$$\left[\begin{array}{cc|cc} a & b & 1 & 0 \\ c & d & 0 & 1 \end{array}\right]$$

ROW REDUCE?

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} x_1 = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} x_2 = \begin{bmatrix} w \\ z \end{bmatrix}$$

WHAT ARE $x, y, w, \& z$?