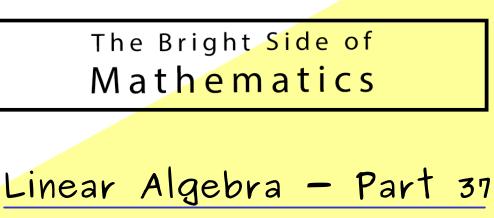
**BECOME A MEMBER** 

ON STEADY



$$A \times = b$$
  $\xrightarrow{\text{augmented matrix}}$   $(A | b)$ 

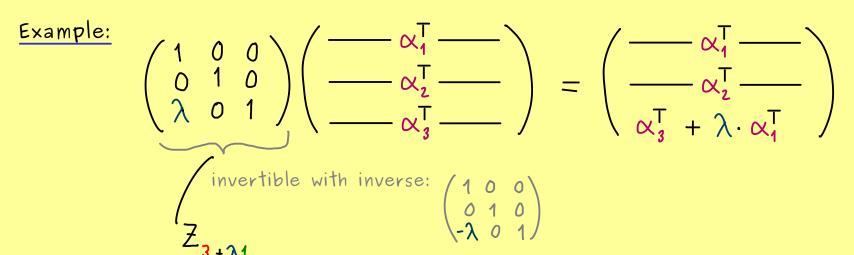
$$A \longleftrightarrow \widehat{A} : MA = \widehat{A} \iff A = \widehat{M}^{1} \widehat{A}$$

$$Ax = b \iff MAx = Mb$$
 (new system)

$$\underbrace{\text{Example:}}_{A = \begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix}} \longrightarrow MA = \begin{pmatrix} 1 & 3 \\ 0 & -7 \end{pmatrix}$$

$$A = \begin{pmatrix} a_{11} \cdots a_{1n} \\ \vdots & \vdots \\ a_{in1} \cdots & a_{inn} \end{pmatrix} = \begin{pmatrix} \hline & \alpha_{1}^{T} \\ \vdots \\ \hline & \alpha_{1n}^{T} \end{pmatrix}$$

$$C^{\mathsf{T}} = (0, \dots, 0, c_{\mathbf{i}}, 0, \dots, 0, c_{\mathbf{j}}, 0, \dots, 0) \implies C^{\mathsf{T}}A = c_{\mathbf{i}} \alpha_{\mathbf{i}}^{\mathsf{T}} + c_{\mathbf{j}} \alpha_{\mathbf{j}}^{\mathsf{T}}$$



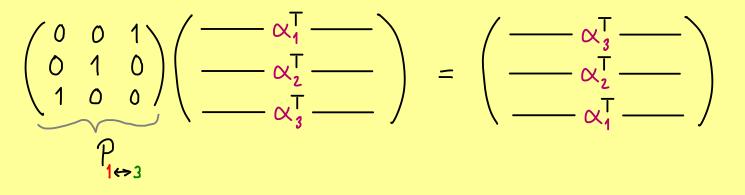
• • /• ]

Definition:

$$Z_{i+\lambda j} \in \mathbb{R}^{n \times m}$$
,  $i \neq j$ ,  $\lambda \in \mathbb{R}$ ,

defined as the identity matrix with  $\lambda$  at the (i,j)th position.

Example: (exchanging rows)



Definition:

 $P_{i \leftrightarrow j} \in \mathbb{R}^{m \times m}$ ,  $i \neq j$ , defined as the identity matrix where the ith and the jth rows are exchanged.

 $\langle \langle M \rangle | \gamma \in Ran(A) \rangle$ 

