

Def<sup>n</sup>: We say that  $S \subseteq V$  "generates"  
"spans"  $V$  if  $\text{span}(S) = V$ .

This. half of what we want from a "basis".

Ex!:  $S = \{M_1, M_2, M_3, M_4\} \subseteq M_{2 \times 2}(\mathbb{R})$

$$M_1 = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \quad M_2 = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix} \quad M_3 = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix} \quad M_4 = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$$

Claim:  $S$  generates  $M_{2 \times 2}(\mathbb{R})$