$$B = \left\{ \begin{bmatrix} 4 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 3 \end{bmatrix}, \begin{bmatrix} \\ \\ \end{bmatrix} \right\}$$

Span $(B) =$

$$\left\{ \vec{v} \;\middle|\; \vec{v} = \alpha_1 \begin{bmatrix} 4 \\ 0 \\ 0 \end{bmatrix} + \alpha_2 \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + \alpha_3 \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} + \alpha_4 \begin{bmatrix} 0 \\ 0 \\ 3 \end{bmatrix} + \alpha_5 \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \right\}$$

$\$$s Span $(B) = \mathbb{R}^3$?

$$\begin{bmatrix} 4 & 4 & 0 & 0 \\ 0 & 3 & 3 & 0 \\ 0 & 2 & 0 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

$\mathbb{R}^3$

1 1 1

$R_3 - R_2 \longrightarrow \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & -1 \end{bmatrix}$

$\text{Span}(\mathbb{R}^3)$

$A = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

$\text{Col}(A) = \{ \vec{v} \mid \vec{v} = \sum \alpha_i \vec{v}_i \}$, $\alpha_i \in \mathbb{R}$, $\vec{v}_i$: columns of A

$\text{Col}(A)$

CORRECT: $\text{Span}\left\{ \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \end{bmatrix} \right\}$ ✓

$= \left\{ \vec{v} \mid \vec{v} = \alpha_1 \begin{bmatrix} 0 \\ 0 \end{bmatrix} + \alpha_2 \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \alpha_1, \alpha_2 \in \mathbb{R} \right\}$

$\alpha \vec{v}_1 + \beta \vec{v}_2$

$$\text{span}\left\{\begin{bmatrix}0\\1\end{bmatrix},\begin{bmatrix}1\\0\end{bmatrix}\right\} = \alpha_1\begin{bmatrix}0\\1\end{bmatrix} + \alpha_2\begin{bmatrix}1\\0\end{bmatrix}$$

WRONG

$$A\vec{x} = \vec{b}$$

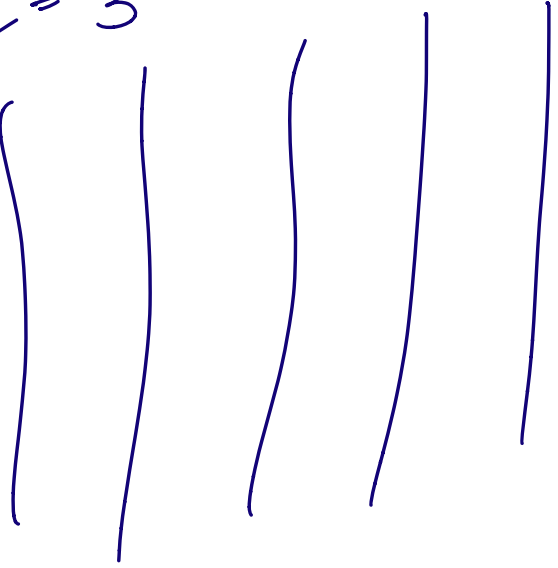
Rows: equations

$$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

$$a_{11}x_1 + a_{12}x_2 = b$$

$$x_1 + x_2 = 3$$

$$\begin{array}{r} x_1 \\ +\ x_2 \\ \hline 3 \end{array}$$



$\vec{s}[0] = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$.

$\vec{s}[n] = ?$ $\quad n \to \infty$.

$A = \begin{bmatrix} 0.75 & 0.25 \\ 0.25 & 0.75 \end{bmatrix}$.

A^n

$A \cdot \vec{s}[0] = \vec{s}[1]$

$A \cdot \vec{s}[1] = \vec{s}[2] = A \cdot A \cdot \vec{s}[0] = A^2 \cdot \vec{s}[0]$.

$A \cdot \vec{s}[n] = \vec{s}[n+1]$

$\vec{s}[3] = A \cdot \vec{s}[2]$

$= A \cdot (A \cdot \vec{s}[1])$

$= A \cdot A \cdot A \cdot \vec{s}[0]$.

$= A^3 \cdot \vec{s}[0]$

$\vec{b} = \begin{bmatrix} 1 \\ \vdots \\ 1 \end{bmatrix}$