

3. Describe the column space and the nullspace of the matrices

$$A = \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 0 & 0 & 3 \\ 1 & 2 & 3 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}.$$

$$C(A) \Rightarrow x\text{-axis} \leftarrow C(B)$$

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} a + \begin{bmatrix} -1 \\ 0 \end{bmatrix} b$$

$$\begin{bmatrix} 0 & 0 & 3 \\ 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$N(A)$$

$$\begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\begin{cases} a = b \\ y = x \end{cases}$$

$$\begin{bmatrix} 0 & 3 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} a \\ c \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$3c = x$$

$$c = \frac{x}{3}$$

$$a + 3c = y$$

$$a = y - x$$

$$N(B) = \left\{ \begin{bmatrix} a \\ b \\ c \end{bmatrix} \mid c=0, b=-\frac{a}{2} \right\}$$

$$C(C) = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$N(C) = \mathbb{R}^3$$

$$xyz$$

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} a \\ b \\ 0 \end{bmatrix}$$

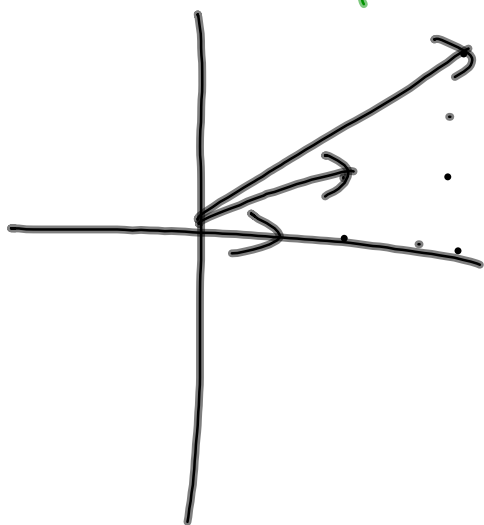
Find the column space and nullspace of A.

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 3 \\ 3 & 1 & 4 \\ 4 & 1 & 5 \end{bmatrix}$$

Find the column space and nullspace of A .

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

$$C(A) \rightarrow \mathbb{R}^2$$



$$N(A)$$

$$\begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}$$

$$\begin{matrix} a \\ \frac{1}{2}a \\ \frac{1}{2}a \end{matrix}$$

$$\begin{bmatrix} 1 \\ \frac{1}{2} \\ \frac{1}{2} \end{bmatrix}$$