Solve

$$\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}\begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 7 \\ 20 \end{bmatrix}$$

5

1

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

$C(A)$

$$\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}\begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

$-3(a+2b=x)$

$3a+5b=y$

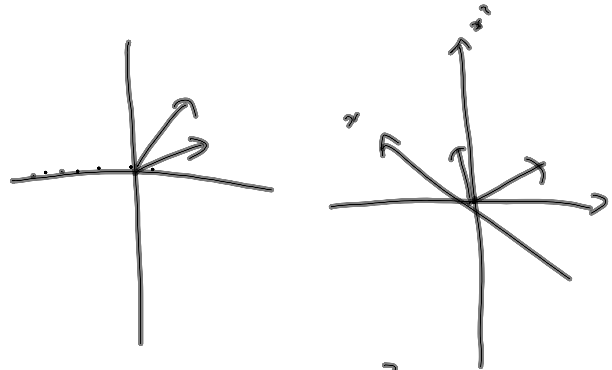
$-b=y-3x$

$\boxed{b}=3x-y$

$a+2(3x-y)=x$

$a=2y-5x$

$$\begin{bmatrix} -5x+2y \\ 3x-y \end{bmatrix} = \begin{bmatrix} -5 & 2 \\ 3 & -1 \end{bmatrix}\begin{bmatrix} x \\ 2 \end{bmatrix}$$



ax^2+bx+c

$\langle 1, x, x^2 \rangle$

$c\langle a, b\rangle = \langle ca, cb\rangle$

$c\langle 2, 0\rangle = \langle 1, 0\rangle$

$2\langle 1, 0\rangle = \langle 2, 0\rangle$

$\frac{1}{2}$

$\boxed{a \in R \Rightarrow \frac{1}{a} \in R}$

0	1

$0+0=0$

$0+1=1$

$1+0=1$

$1+1=0$

$1+1=0$

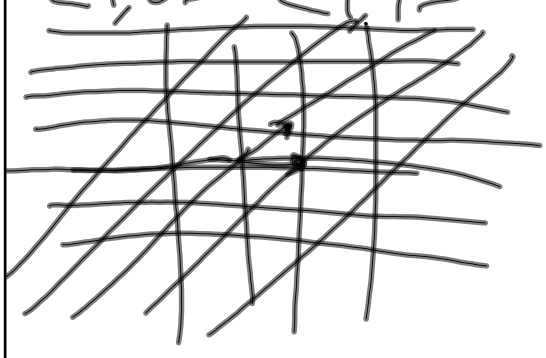
$2(\vec{v}) = 0$

$\vec{v} = 0$

$\langle a, b\rangle$

$a\langle 1, 0\rangle + b\langle 0, 1\rangle$

$\langle 1, 0\rangle \quad \langle 1, 1\rangle$



Solve

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

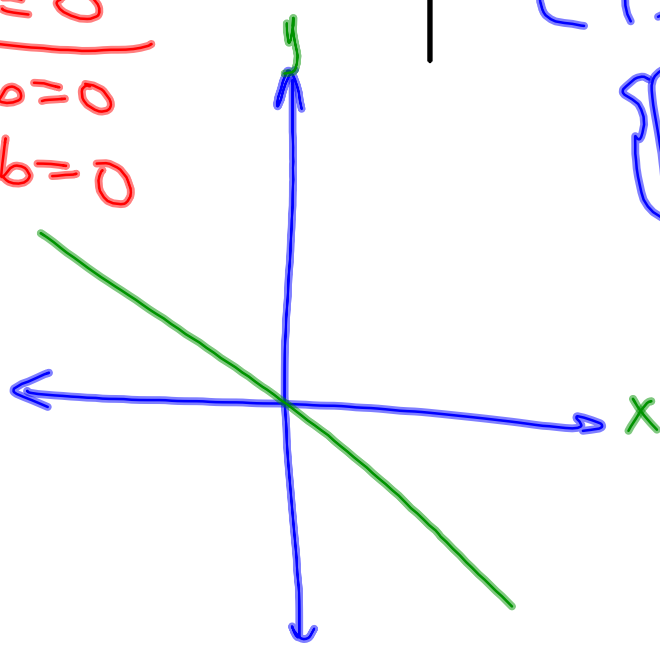
$\rightarrow \begin{bmatrix}0\\0\end{bmatrix}$

$-2(a+3b=0)\rightarrow$

$2a+b=0$

$-3b=0$

$b=0$



$$\begin{bmatrix}1&2\\2&4\end{bmatrix}\begin{bmatrix}a\\b\end{bmatrix}=\begin{bmatrix}0\\0\end{bmatrix}$$

$\begin{bmatrix}0\\0\end{bmatrix}$ $\begin{bmatrix}-2\\1\end{bmatrix}$ $\begin{bmatrix}-4\\2\end{bmatrix}$

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

$\left\{\begin{bmatrix}a\\b\end{bmatrix} \middle| a=-2b,\ b\in\mathbb{R}\right\}$

Nullspace

The ***nullspace*** of a matrix consists of all vectors x such that $\boxed{Ax} = 0$. It is denoted by $N(A)$. It is a subspace of $\mathbf{R}^n$, just as the column space was a subspace of $\mathbf{R}^m$.