$$A = \begin{bmatrix} 1 & -2 & 2 & -5 \\ 2 & -4 & 1 & -1 \\ 3 & -6 & 3 & -6 \end{bmatrix}$$ Find a basis for the null space.

$\boxed{\text{Exam 3, first \#8}}$

$A\vec{x} = \vec{0}$

$$\mathcal{B}_{null(A)} = \left\{ \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 3 \\ 1 \end{bmatrix} \right\}$$

$$[A|\vec{0}] \xRightarrow{rref} \begin{array}{ccccc} x_1 & x_2 & x_3 & x_4 & \\ \end{array}$$

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

$x_4 = t$

$x_3 - 3x_4 = 0$

$x_3 = 3t$

$x_2 = s$

$x_1 - 2x_2 + x_4 = 0$

$x_1 = 2s - t$

$$\vec{x} = \begin{bmatrix} 2s-t \\ s \\ 3t \\ t \end{bmatrix} = \begin{bmatrix} 2s \\ s \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} -t \\ 0 \\ 3t \\ t \end{bmatrix} = s\begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \end{bmatrix} + t\begin{bmatrix} -1 \\ 0 \\ 3 \\ 1 \end{bmatrix}$$

Exam 3, #13

a) $\begin{bmatrix} 2a \\ b \\ a \end{bmatrix} = a\begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} + b\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$

$\begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix} + \begin{bmatrix} -6 \\ 2 \\ -3 \end{bmatrix} = \begin{bmatrix} -4 \\ 3 \\ -2 \end{bmatrix}$

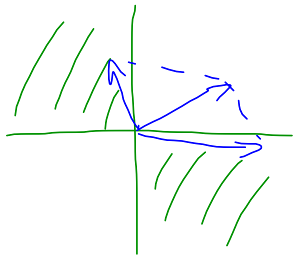
$a = -3$

$b = 2$

b) $\vec{x} = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} + t \begin{bmatrix} 4 \\ 0 \\ 3 \end{bmatrix} \stackrel{?}{=} \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$ line in $\mathbb{R}^3$

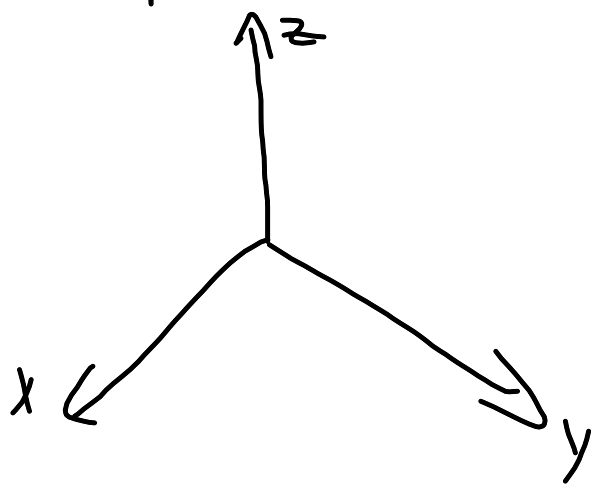
Not a subspace, doesn't contain $\vec{0}$

c) $\begin{bmatrix} x \\ y \end{bmatrix}$ such that $xy \leq 0$



Not closed under addition, so not a subspace.

d) xz-plane in $\mathbb{R}^3$

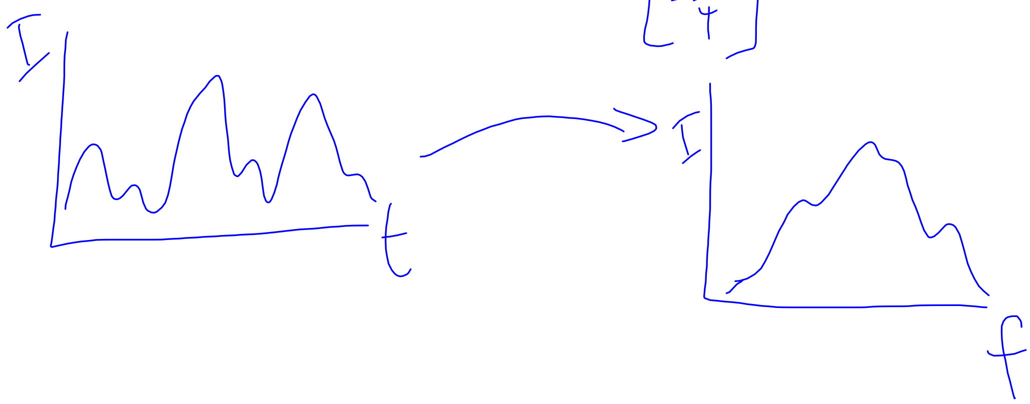


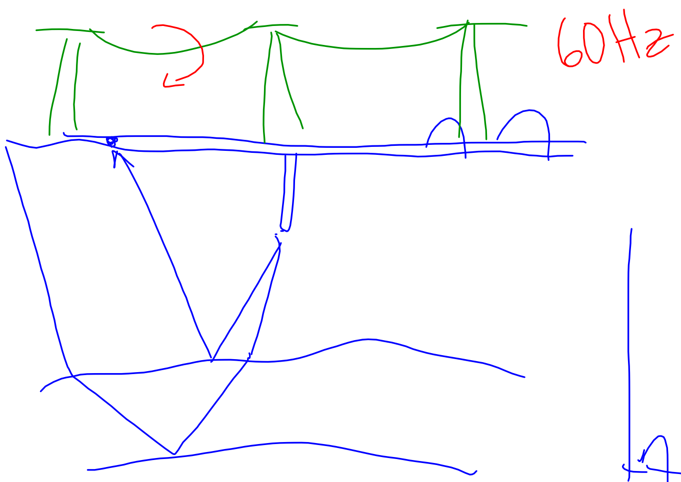
subspace

<u>Office Monday</u>

10 - 2 other if asked

$$[f]_{\mathcal{E}} = \begin{bmatrix} 4 \\ 6 \\ 3 \\ 2 \end{bmatrix} \qquad [f]_{W} = \begin{bmatrix} \frac{15}{4} \\ \frac{5}{4} \\ -\frac{3}{4} \\ -\frac{1}{4} \end{bmatrix}$$

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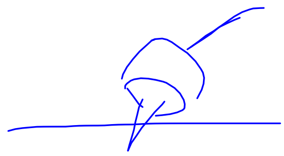

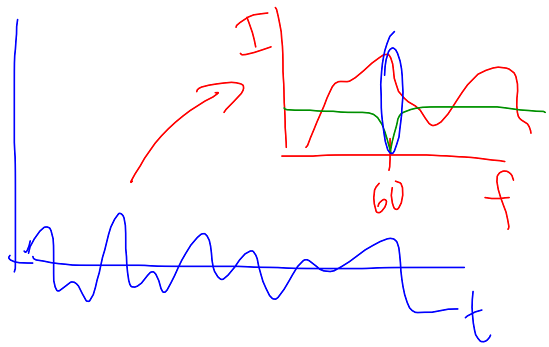
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