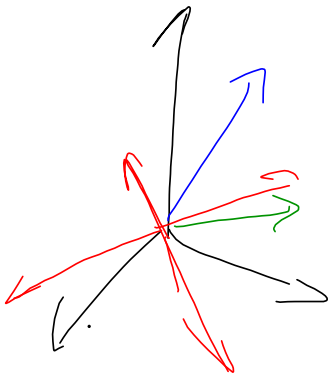
Office Today

11-12, 2-4

$$\left\{\begin{bmatrix}1\\2\\3\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$$

What world? $\mathbb{R}^3$

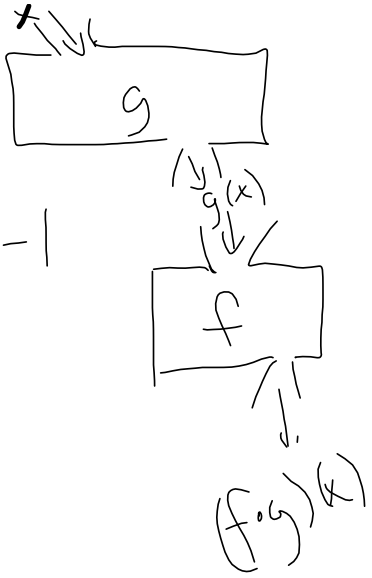
What can I build with these? A plane



$T: \mathbb{R}^2 \to \mathbb{R}^3$

$f(x) = x^2 + 5x - 2$ $g(x) = 2x - 1$

$(f \circ g)(x) = f[g(x)]$



$$R\begin{bmatrix}x_1\\x_2\end{bmatrix}=\begin{bmatrix}5x_2\\3x_1+x_2\\x_1-2x_2\end{bmatrix} \qquad S\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix}=\begin{bmatrix}x_1+x_2+0x_3\\0x_1+x_2+x_3\\x_1+x_3\end{bmatrix} \qquad T\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix}=\begin{bmatrix}x_1x_2\\x_2x_3\end{bmatrix}$$

$$[R]=\begin{bmatrix}0&5\\3&1\\1&-2\end{bmatrix} \qquad [S]=\begin{bmatrix}1&1&0\\0&1&1\\1&0&1\end{bmatrix}$$

$$S \circ R \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 3x_1 + 6x_2 \\ 4x_1 - x_2 \\ x_1 + 3x_2 \end{bmatrix}$$

$$[S \circ R] = \begin{bmatrix} 3 & 6 \\ 4 & -1 \\ 1 & 3 \end{bmatrix} \stackrel{?}{=} [S][R]$$

$$S \circ R \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = S\left(R \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right)$$

$R : \mathbb{R}^2 \to \mathbb{R}^3$

$S : \mathbb{R}^3 \to \mathbb{R}^3$

$$= S \begin{bmatrix} 5x_2 \\ 3x_1 + x_2 \\ x_1 - 2x_2 \end{bmatrix}$$

$R \circ S$ is not possible

$$= \begin{bmatrix} 5x_2 + 3x_1 + x_2 \\ 3x_1 + x_2 + x_1 - 2x_2 \\ 5x_2 + x_1 - 2x_2 \end{bmatrix}$$

$$= \begin{bmatrix} 3x_1 + 6x_2 \\ 4x_1 - x_2 \\ x_1 + 3x_2 \end{bmatrix}$$