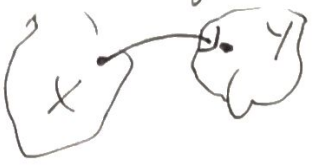
Formal Functions

$F: X \to Y$



$g: \mathbb{R}^2 \to \mathbb{R}$ Scalar valued function

map= $h: \mathbb{R}^2 \to \mathbb{R}^3$ vector valued function

def= $h: (x,y) \mapsto (x+y, x-y, xy)$

$\begin{bmatrix} 2 \\ 0 \end{bmatrix} \begin{bmatrix} 1 & -1 \end{bmatrix}^T = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$

$F\left(\begin{bmatrix} x \\ 0 \end{bmatrix}\right) \mapsto \begin{bmatrix} x \\ -2x \end{bmatrix}$

$F\left(\begin{bmatrix} 0 \\ y \end{bmatrix}\right) \mapsto \begin{bmatrix} 3y \\ 0 \end{bmatrix}$

$1 \cdot \begin{bmatrix} 3 \\ 0 \end{bmatrix} + -1 \begin{bmatrix} 1 \\ -2 \end{bmatrix} = \begin{bmatrix} 2 \\ -2 \end{bmatrix}$

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

$x \begin{bmatrix} 1 \\ 0 \end{bmatrix} \mapsto x \begin{bmatrix} a \\ c \end{bmatrix}$

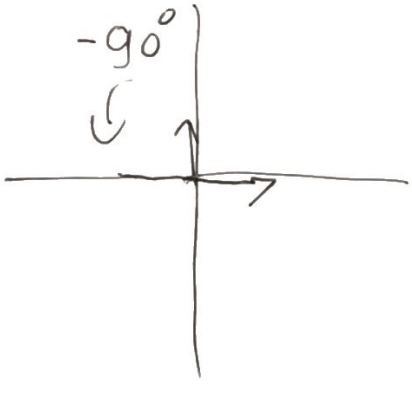
$y \begin{bmatrix} 0 \\ 1 \end{bmatrix} \mapsto y \begin{bmatrix} b \\ d \end{bmatrix}$

$F\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) \mapsto x \begin{bmatrix} 1 \\ 0 \end{bmatrix} + y \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

$F\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) \mapsto x \begin{bmatrix} 1 \\ 2 \end{bmatrix} + y \begin{bmatrix} 3 \\ 0 \end{bmatrix}$

$\begin{bmatrix} ax + by \\ cx + dy \end{bmatrix}$

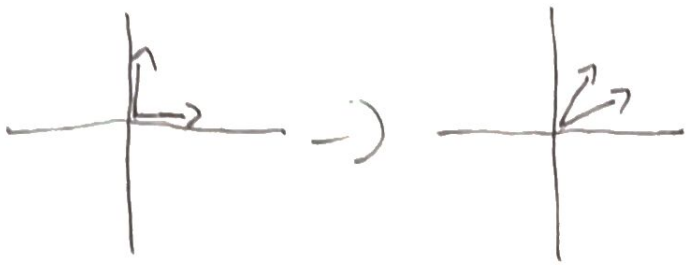
$\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} -1+6 \\ 2+0 \end{bmatrix} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$



$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \to \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

$\begin{bmatrix} 0 \\ 1 \end{bmatrix} \to \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

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



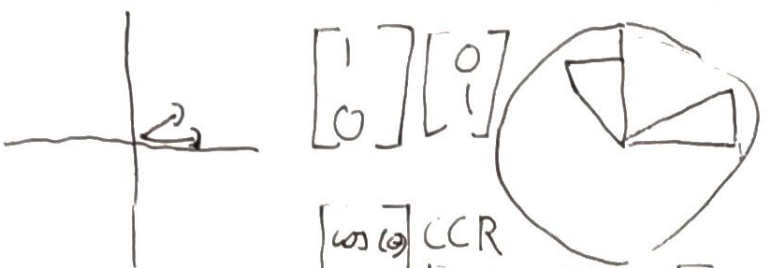
$\begin{bmatrix}1\\0\end{bmatrix} \to \begin{bmatrix}1\\0,5\end{bmatrix}$ $\begin{bmatrix}1 & 0,5\\ 0,5 & 1\end{bmatrix}$ $\begin{bmatrix}a & b\\ c & d\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix} \mapsto \begin{bmatrix}xa+yb\\xc+yc\end{bmatrix}$

$\begin{bmatrix}0\\1\end{bmatrix} \to \begin{bmatrix}0,5\\1\end{bmatrix}$ $\begin{bmatrix}1\\0\end{bmatrix} = \begin{bmatrix}a\\c\end{bmatrix}$ $\begin{bmatrix}0\\1\end{bmatrix} = \begin{bmatrix}b\\d\end{bmatrix}$

$=x$ $=y$

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

(cos, sin)



$\begin{bmatrix}\cos\theta\\ \sin\theta\end{bmatrix}$ CCR $\begin{bmatrix}-\sin\theta\\ -\cos\theta\end{bmatrix} = \begin{bmatrix}\cos\theta-\sin\theta\\ \sin\theta \quad -\cos\theta\end{bmatrix}$

$\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} = 90°$

$\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$ $180°$ $\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix} = \begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix} = 90°\cdot 2$

Multiply linear transformations.