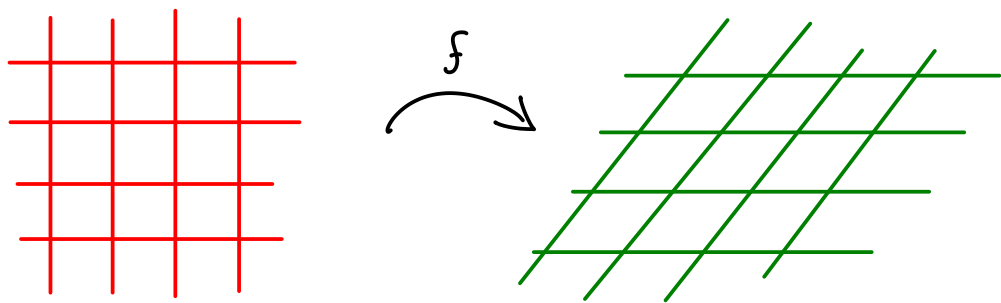


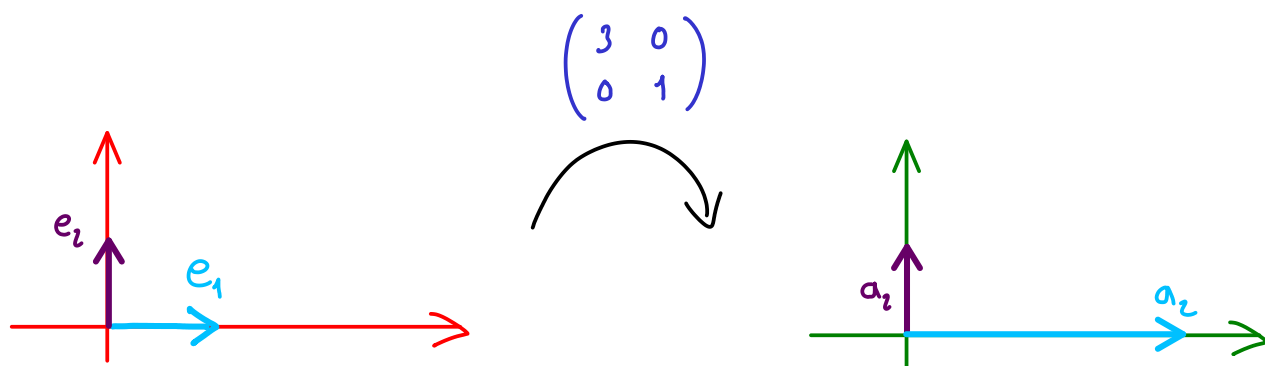
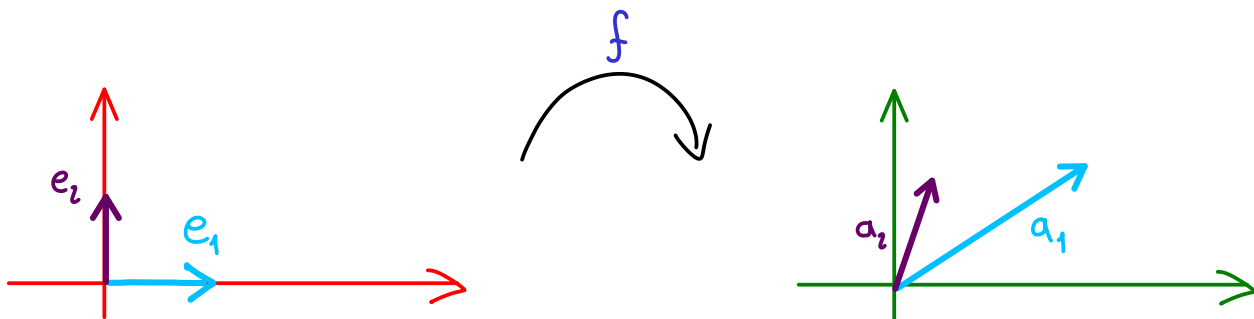
## Linear Algebra - Part 21

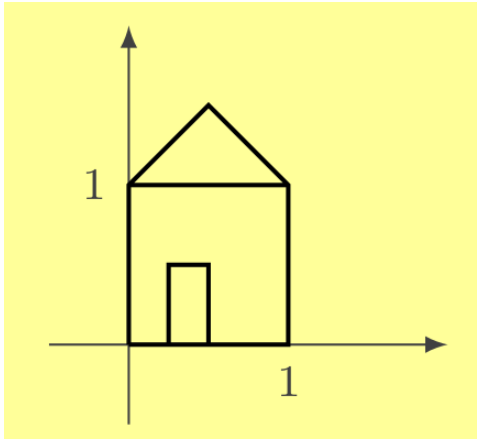
$$f: \mathbb{R}^n \rightarrow \mathbb{R}^m \text{ linear}$$

- preserves the linear structure
- linear subspaces are sent to linear subspaces

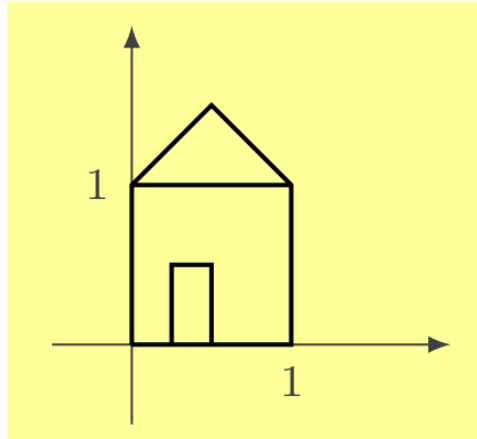
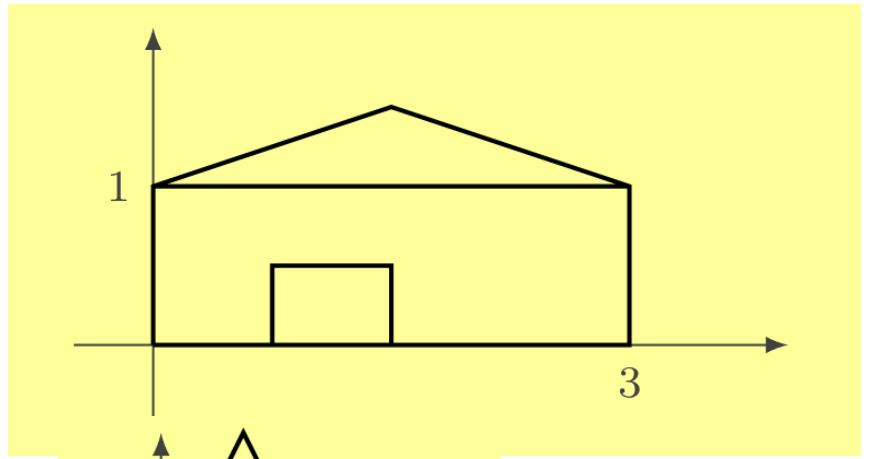


Examples:  $f: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ ,  $f(x) = \begin{pmatrix} | & | \\ a_1 & a_2 \\ | & | \end{pmatrix} x$

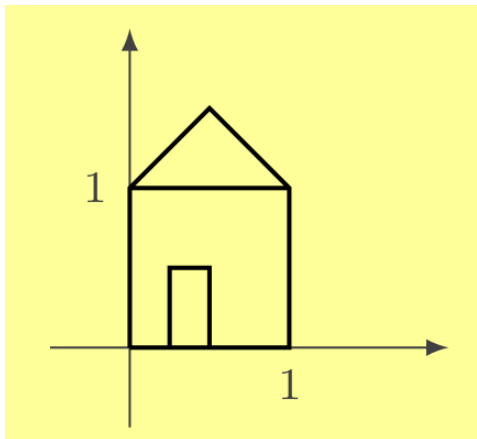
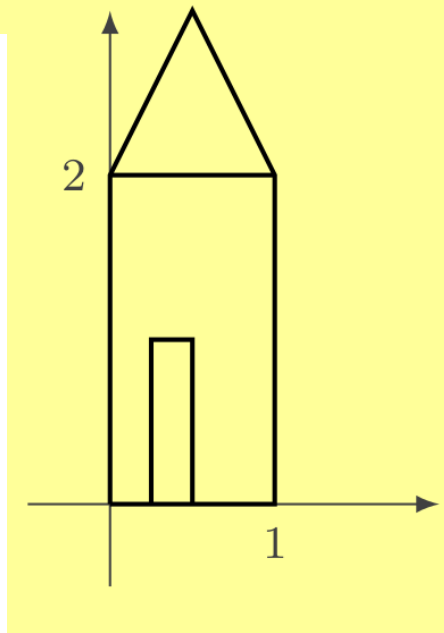




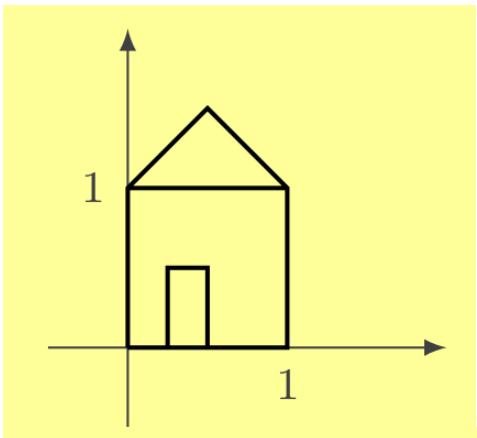
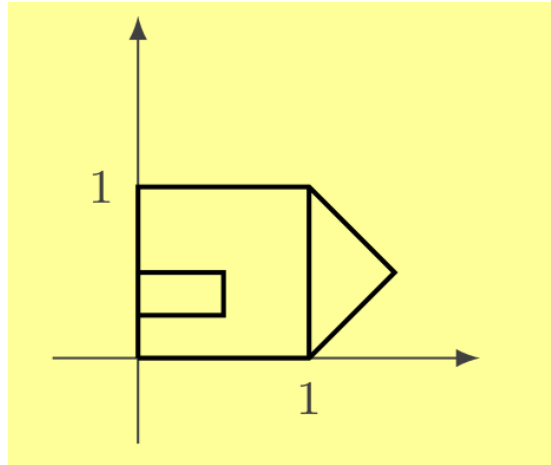
$$\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$$



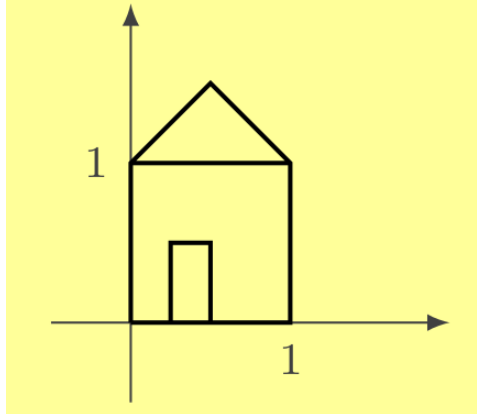
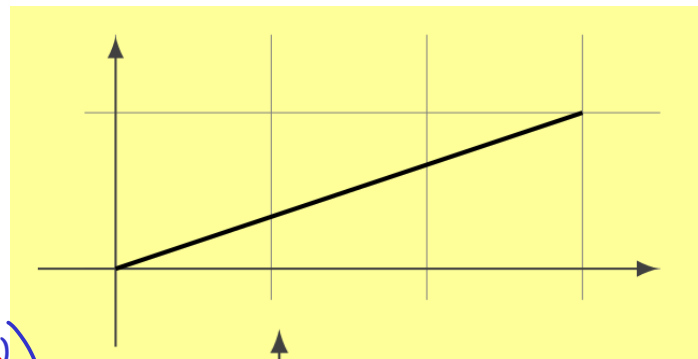
$$\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$$



$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$



$$\begin{pmatrix} 3 & 0 \\ 1 & 0 \end{pmatrix}$$



$$\begin{pmatrix} \cos(\alpha) & -\sin(\alpha) \\ \sin(\alpha) & \cos(\alpha) \end{pmatrix}$$

