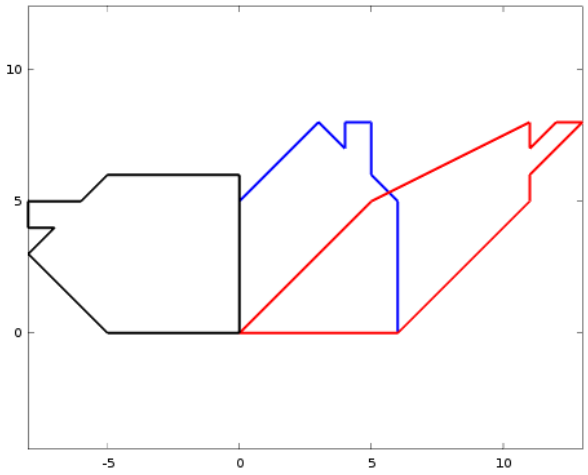
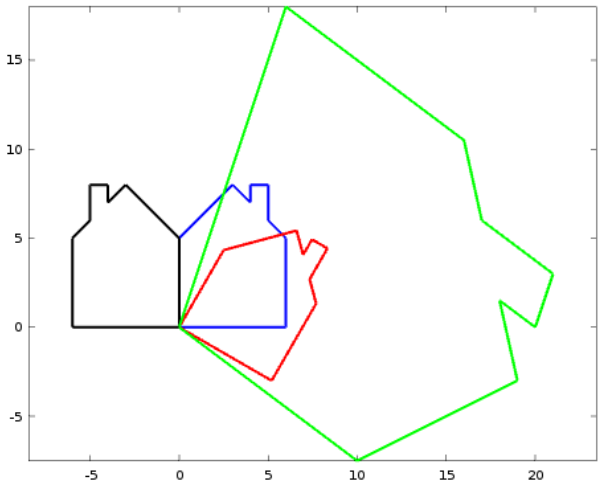
Matrices as linear transformations – examples

blue . . . the original
red, black, green . . . images of different linear transformations



90^o rotation $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, shear $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$



mirroring $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$, $\alpha = -\pi/6$ rotation $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, general lin. transf. $\begin{bmatrix} 1 & 2 \\ 3 & -3/2 \end{bmatrix}$

Observations:

- all lines are transformed to lines
- parallel lines remain parallel
- the origin does not change place