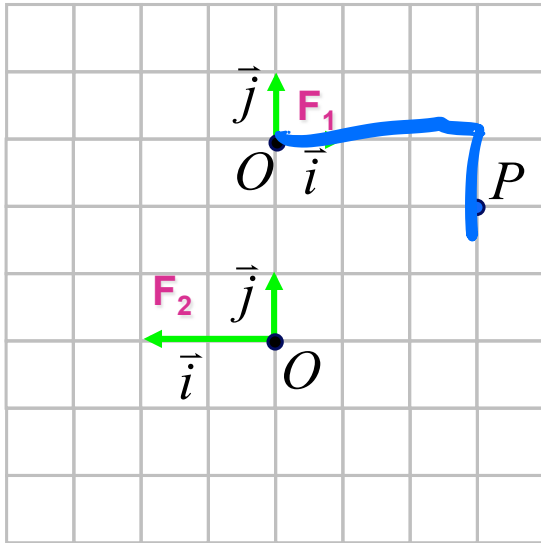


Transformations as a change of basis



$$P_1 = (3, -1) \quad P_2 = (-1.5, 2) \quad \text{Goal: } P_2 = M P_1$$

$$P = O + x\vec{i} + y\vec{j}$$

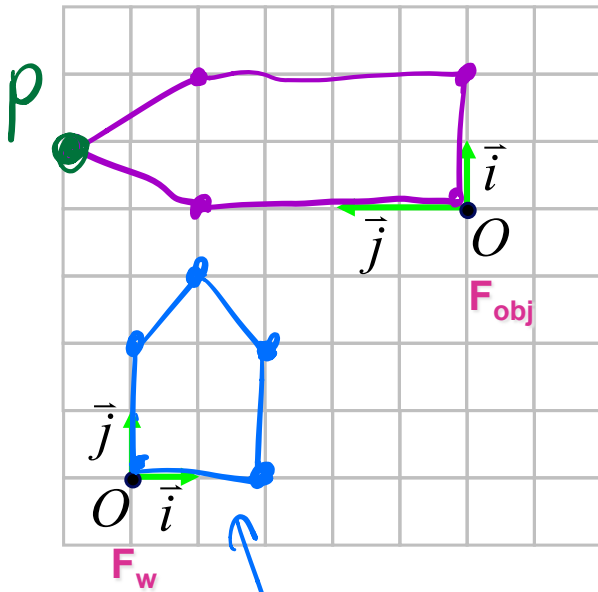
$$\begin{bmatrix} x_1 \\ y_1 \end{bmatrix}_1 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}_1 + x_1 \begin{bmatrix} 1 \\ 0 \end{bmatrix}_1 + y_1 \begin{bmatrix} 0 \\ 1 \end{bmatrix}_1$$

$$\begin{bmatrix} x_2 \\ y_2 \end{bmatrix}_2 = 1 \begin{bmatrix} 0 \\ 3 \end{bmatrix}_2 + x_1 \begin{bmatrix} -0.5 \\ 0 \end{bmatrix}_2 + y_1 \begin{bmatrix} 0 \\ 1 \end{bmatrix}_2$$

check:

$$\begin{bmatrix} -1.5 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} -0.5 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ -1 \\ 1 \end{bmatrix} \quad \begin{bmatrix} x_2 \\ y_2 \\ 1 \end{bmatrix} = \begin{bmatrix} -0.5 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ y_1 \\ 1 \end{bmatrix}$$

Transformations as a change of basis



Goal: $P_w = M P_{obj}$

$$\begin{bmatrix} -1 \\ 5 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & -2 & 5 \\ 1 & 0 & 4 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix}$$

Labels: i_{obj} , j_{obj} , O_{obj} , P_{obj}

untransformed house, i.e., $F_w = F_h$