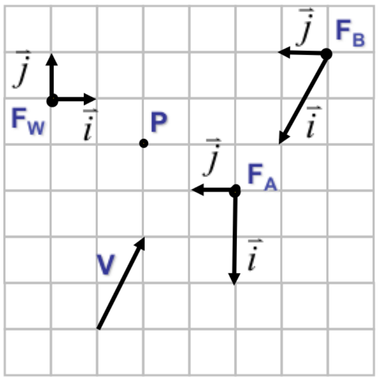
1. Coordinate Frames



$$\begin{bmatrix} x \\ y \\ 1 \end{bmatrix}_W = \begin{bmatrix} 0 & -1 & 4 \\ -2 & 0 & -2 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}_A$$

$$\begin{bmatrix} x \\ y \\ 1 \end{bmatrix}_A = \begin{bmatrix} 1 & 0 & -1.5 \\ 1 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}_B$$

(a) (3 points) Express point P in each of the three coordinate frames.

$P_W(2,-1)$ $P_A(-0.5,2)$ $P_B(1,3)$

(b) (3 points) Express ~~point~~ vector V in each of the three coordinate frames.

$V_W(1,2)$ $V_A(-1,-1)$ $V_B(-1,0)$

(c) (2 points) Find the 3×3 homogeneous transformation matrix which takes a point from F_A and expresses it in terms of F_W. I.e., determine M, where $P_W = MP_A$.

See above

(d) (2 points) Find the 3×3 homogeneous transformation matrix which takes a point from F_B and expresses it in terms of F_A. I.e., determine M, where $P_A = MP_B$.

See above