CONVERTING CAMERA TO WORLD

Point in camera coordinates:
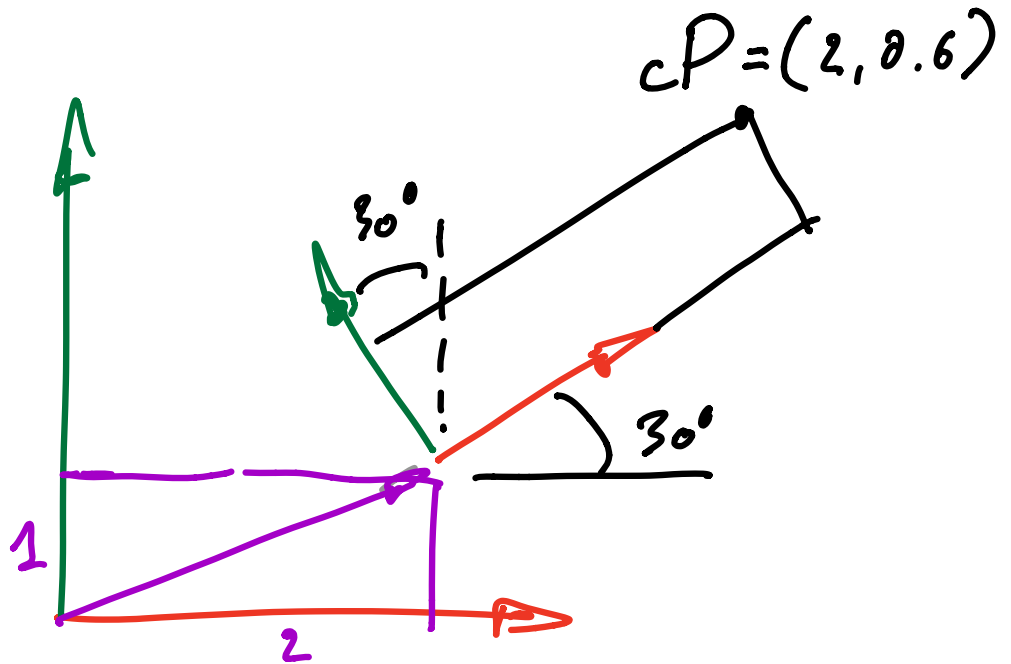

$$cP = (2, 0.6)$$

$$wP = \vec{t} + {}_wR_c \, cP$$

$$cP = (2, 0.6)$$

W   C
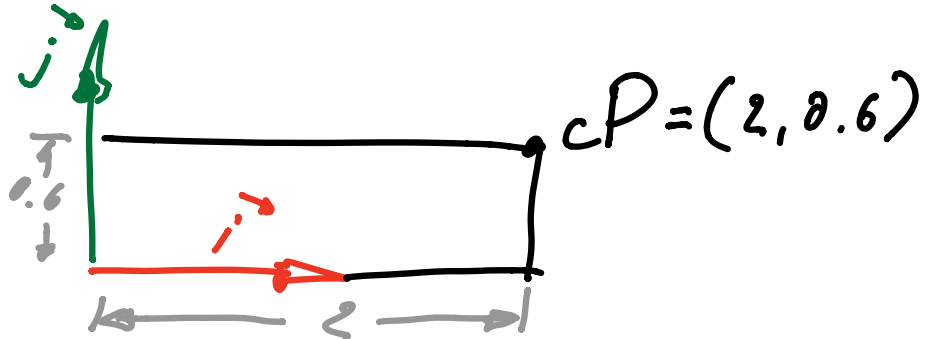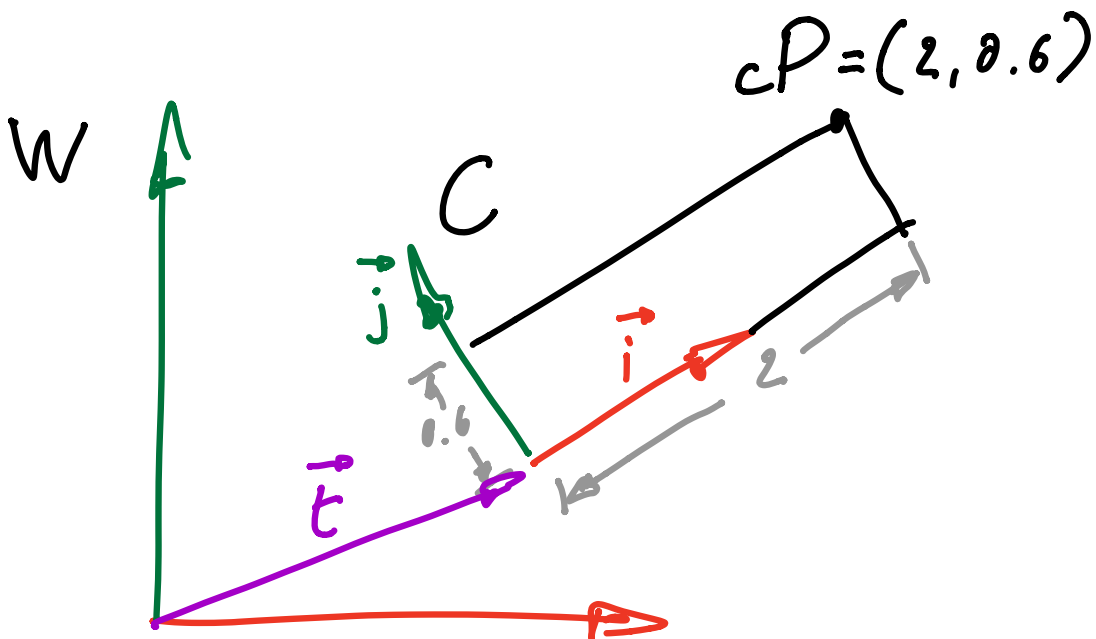
$$wP = \vec{t} + 2.0\,\vec{i} + 0.6\,\vec{j}$$

$$= \begin{bmatrix} \vec{t} \end{bmatrix} + \begin{bmatrix} \vec{i} & \vec{j} \end{bmatrix} \begin{bmatrix} 2.0 \\ 0.6 \end{bmatrix}$$

$cP = (2, 0.6)$

$90°$

$30°$

1

2

$$\boxed{wP = t + wRc \; cP}$$

$$= \begin{bmatrix} 2 \\ 1 \end{bmatrix} + \begin{bmatrix} c30 & -s30 \\ s30 & c30 \end{bmatrix} \begin{bmatrix} 2 \\ 0.6 \end{bmatrix}$$
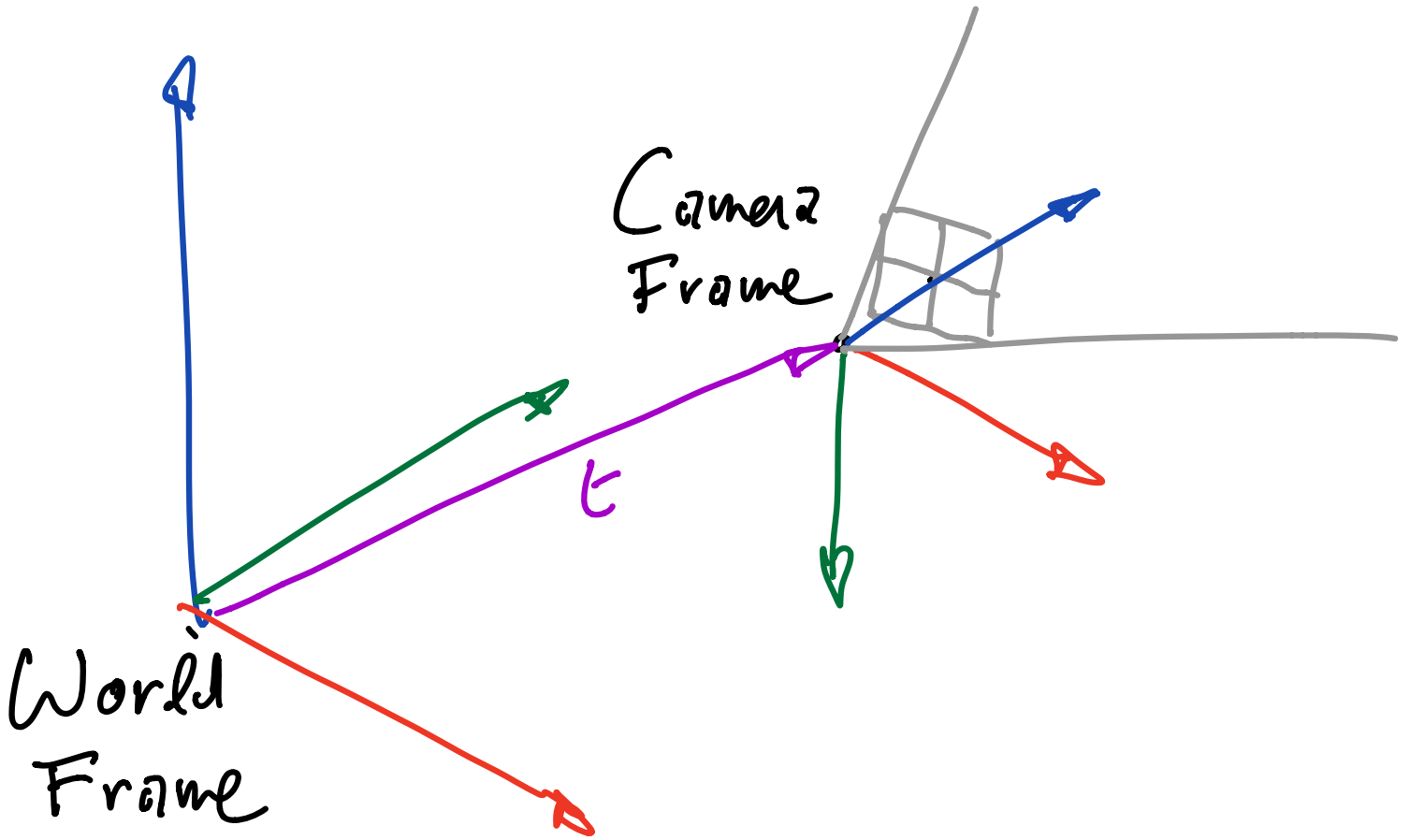
$$= \begin{bmatrix} 2 + 2\cos 30° - 0.6 \sin 30° \\ 1 + 2 \sin 30° + 0.6 \cos 30° \end{bmatrix}$$

$\cos 30 = \sqrt{3}/2$

$\sin 30 = 1/2$
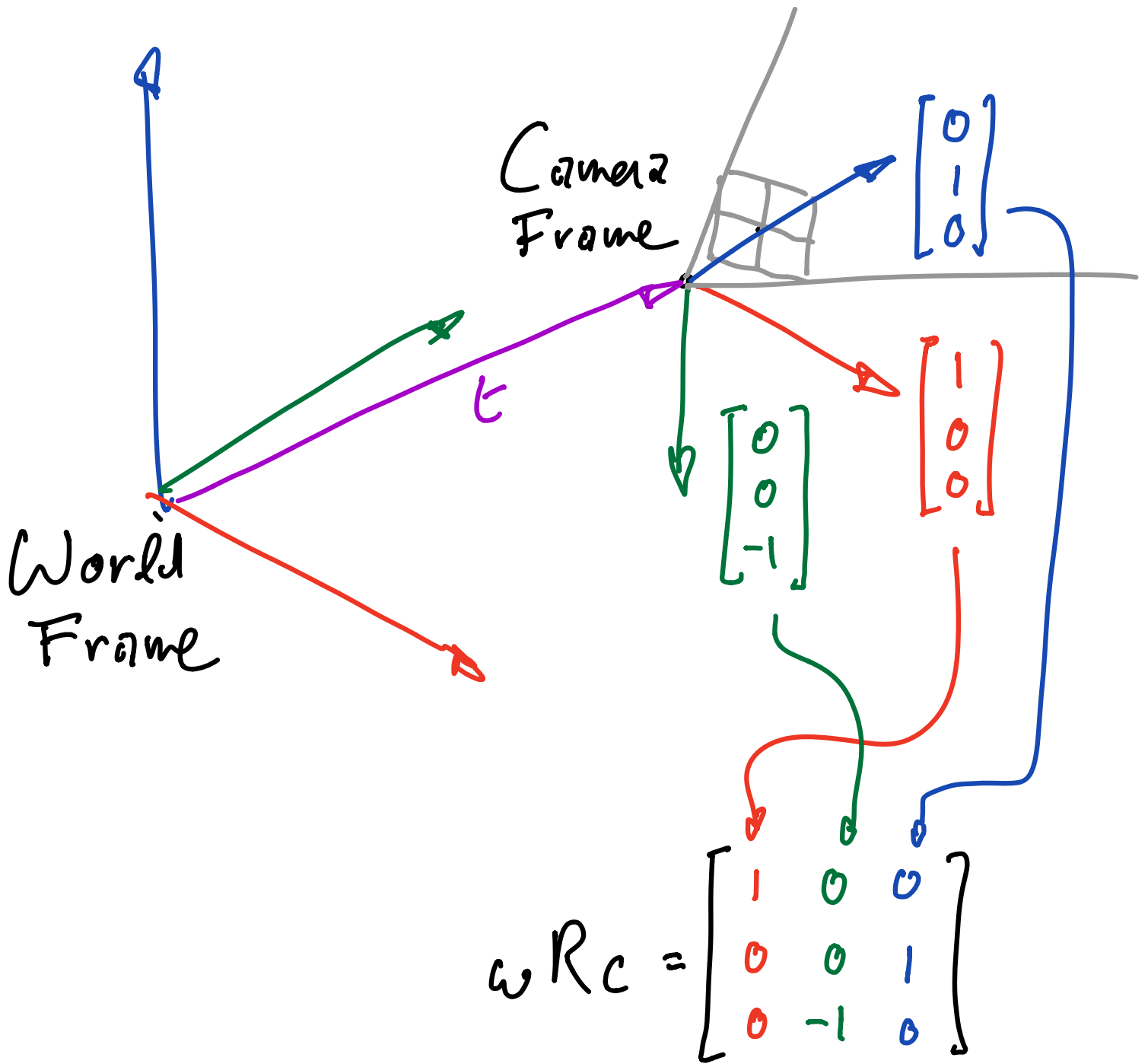
$$= \begin{bmatrix} 2 + \sqrt{3} - 0.3 \\ 1 + 1 + 0.6\sqrt{3} \end{bmatrix} = \begin{bmatrix} 3.43 \\ 3.04 \end{bmatrix}$$

Camera Frame

t

World Frame

$$_wP = t + {_w}R_c \cdot {_c}P$$

Camera
Frame

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

t

World
Frame

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

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

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

$$wP = t + wR_c \cdot cP$$