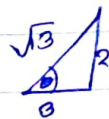
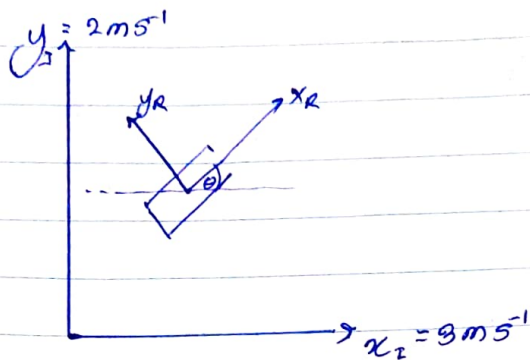


01)

a)



$$\theta = \tan^{-1}\left(\frac{2}{3}\right)$$

$$= 33.7^\circ$$

$$\cos\theta = \frac{3}{\sqrt{13}} \quad \sin\theta = \frac{2}{\sqrt{13}}$$

$$= 0.832 \quad = 0.555$$

$$y_R = 0$$

$$e_R = R(\theta) e_I$$

$$e_R = \begin{bmatrix} \cos\theta & \sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_I \\ y_I \\ \theta_I \end{bmatrix}$$

$$= \begin{bmatrix} 0.832 & 0.555 & 0 \\ -0.555 & 0.832 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$$

$$x_R = 0.832 \times 3 + 0.555 \times 2 + 0 \times 1$$

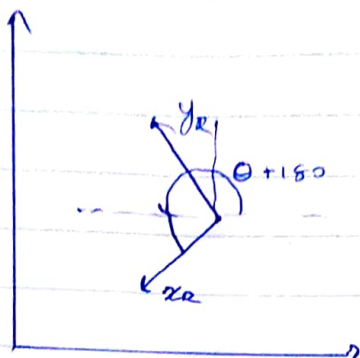
$$= \underline{\underline{3.606 \text{ m/s}}}$$

$$y_R = -0.555 \times 3 + 0.832 \times 2 + 0 \times 1$$

$$= -0.001$$

$$\approx \underline{\underline{0}}$$

b)



when opposite,

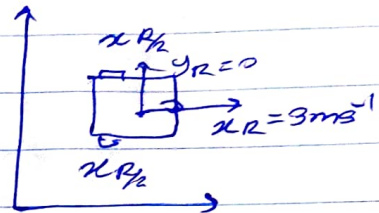
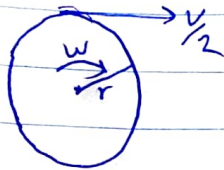
$$\theta = (180^\circ + \theta)$$

$$e_R = R(\theta) e_R$$

$$e_R = \begin{bmatrix} \cos(180^\circ + \theta) & \sin(180^\circ + \theta) & 0 \\ -\sin(180^\circ + \theta) & \cos(180^\circ + \theta) & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \\ 0 \end{bmatrix}$$

$$\begin{aligned} \cdot V_{x_R} &= (-8.32 \times 3) + (-0.555 \times 2) \\ &= \underline{\underline{-3.61 \text{ m s}^{-1}}} \end{aligned}$$

$$V_{y_R} = \underline{\underline{0}}$$



$$d = 3 \times 10^{-2} \text{ m}$$

$$x_2 = 3 \text{ m s}^{-1}$$

$$u_2 \approx 1.5$$

under 3 $\frac{2}{2 \times 1.5 \times 10^{-2} \text{ rad s}^{-1}}$

$$\omega = 100 \text{ rad/s}$$