Rotate the vectors

$$x_1 := \begin{bmatrix} 2 \\ 3 \end{bmatrix}, x_2 := \begin{bmatrix} 0 \\ -1 \end{bmatrix}$$

by 30 degrees

To solve this problem we just apply the rotation matrix

$$M_\theta = \begin{bmatrix} \cos(\theta) & -\sin(\theta) \\ \sin(\theta) & \cos(\theta) \end{bmatrix} = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$$

$$M_\theta x_1 = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} \sqrt{3} - \frac{3}{2} \\ 1 + 3\frac{\sqrt{3}}{2} \end{bmatrix}$$

$$M_\theta x_2 = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix} [0 \ -1] = \begin{bmatrix} \frac{1}{2} \\ -\frac{\sqrt{3}}{2} \end{bmatrix}$$