Rotating a vector in R2

Rotation angle in degree

$$\theta = rad(45.000) = rad(45.000) = 0.785 \tag{1}$$

Rotation matrix in R2

$$\mathbf{A} = \begin{pmatrix} cos(\theta) & (-sin(\theta)) \\ sin(\theta) & cos(\theta) \end{pmatrix} = \begin{pmatrix} 0.707 & (-0.707) \\ 0.707 & 0.707 \end{pmatrix} \tag{2}$$

$$\vec{e_x} = \begin{pmatrix} 1.000 \\ 0.000 \end{pmatrix} \tag{3}$$

$$\vec{e'} = \mathbf{A} \cdot \vec{e_x} = \begin{pmatrix} 0.707 & (-0.707) \\ 0.707 & 0.707 \end{pmatrix} \cdot \begin{pmatrix} 1.000 \\ 0.000 \end{pmatrix} = \begin{pmatrix} 0.707 \\ 0.707 \end{pmatrix} \tag{4}$$