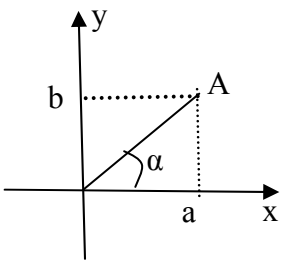
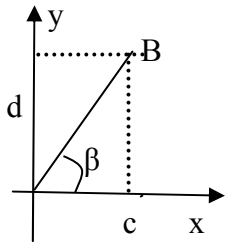
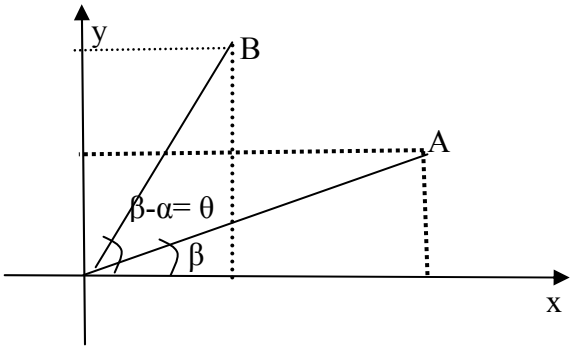
Image Rotation







$$\begin{bmatrix} c \\ d \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix}$$

$$\begin{bmatrix} x_2 \\ y_2 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x_1 \\ y_1 \end{bmatrix}$$

P161) A(3,4) noktasi a)pozitif yonde (saat yonunun tersi) 30^0, b)negatif yonde 60^0 c)pozitif yonde 90^0 d)negatif yonde 90^0 e)pozitif yonde 180^0 d)negatif yonde 180^0 dondurulurse, yeni noktanin koordinatlari nedir.

$x_2 = x_1 \cos\theta - y_1 \sin\theta$

$y_2 = x_1 \sin\theta + y_1 \cos\theta$

a) $x_2 = 3 \cos 30 - 4 \sin 30 = 0.59$

$y_2 = 3 \sin 30 + 4 \cos 30 = 4.96$

x1=3, y1=4, θ =30, x2=0.59, y2=4.96,
x1=3, y1=4, θ =-60, x2=4.96, y2=-0.59,
x1=3, y1=4, θ =90, x2=-4, y2=3,
x1=3, y1=4, θ =-90, x2=4, y2=-3,
x1=3, y1=4, θ =180, x2=-3, y2=-4,
x1=3, y1=4, θ =-180, x2=-3, y2=-4,

P321)P noktasi A noktasi etrafinda θ kadar dondurulurse Q noktasinin koordinatlarini hesaplayin.

A noktasi orogin olsa idi

$$\begin{bmatrix} x_2 \\ y_2 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x_1 \\ y_1 \end{bmatrix}$$

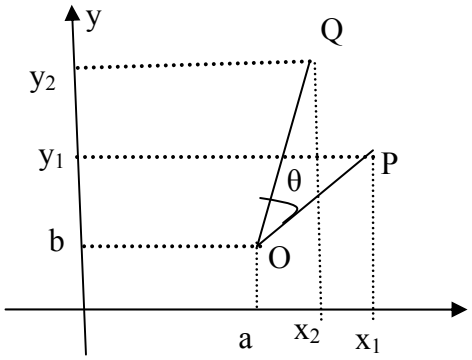
bagintisi gecerli olacakti. O halde bu noktalarin origine uzakligini eklersek dondurme formulunu bulmus oluruz.

$$\begin{bmatrix} x_2 - a \\ y_2 - b \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x_1 - a \\ y_1 - b \end{bmatrix}$$

veya

$$\begin{bmatrix} x_2 \\ y_2 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x_1 - a \\ y_1 - b \end{bmatrix} + \begin{bmatrix} a \\ b \end{bmatrix}$$

bagintisi gecerli olacakti.



P161) P(3,4) noktasi A(1,2) noktasi etrafinda a)pozitif yonde (saat yonunun tersi) 30^0, b)negatif yonde 60^0 c)pozitif yonde 90^0 d)negatif yonde 90^0 e)pozitif yonde 180^0 d)negatif yonde 180^0 dondurulurse, yeni noktanin koordinatlari nedir.

$$\begin{bmatrix} x_2 \\ y_2 \end{bmatrix} = \begin{bmatrix} \cos 30 & -\sin 30 \\ \sin 30 & \cos 30 \end{bmatrix} \begin{bmatrix} 3-1 \\ 4-2 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 1.73 \\ 4.73 \end{bmatrix}$$

x1=3, y1=4, teta=30, ox=1, oy=2, x2=1.73, y2=4.73,
x1=3, y1=4, teta=-60, ox=1, oy=2, x2=3.73, y2=1.26,
x1=3, y1=4, teta=90, ox=1, oy=2, x2=-1, y2=4,
x1=3, y1=4, teta=-90, ox=1, oy=2, x2=3, y2=0
x1=3, y1=4, teta=180, ox=1, oy=2, x2=-1, y2=0
x1=3, y1=4, teta=-180, ox=1, oy=2, x2=-1, y2=0,