Computer Graphics sheet no. 6

Exercise 6.2

a) Transformation matrix

$$\begin{pmatrix} \cos(\phi) & -\sin(\phi) \\ \sin(\phi) & \cos(\phi) \end{pmatrix}$$

$$\begin{pmatrix} \cos(30°) & -\sin(30°) \\ \sin(30°) & \cos(30°) \end{pmatrix} \cdot \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0{,}86602 & -0{,}5 \\ 0{,}5 & 0{,}86602 \end{pmatrix} \cdot \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$= \begin{pmatrix} 0{,}86602 \\ 0{,}5 \end{pmatrix}$$

b) B looks like a standard basis $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ while B' looks like rotated 30° if we look at a) the resuld coordinates for $(1, 0)^T$ equals rotated Basis one at the buttom right

c) $$\begin{pmatrix} \cos(\phi) & -\sin(\phi) \\ \sin(\phi) & \cos(\phi) \end{pmatrix} \times \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$= \begin{pmatrix} \cos(\phi) & -\sin(\phi) \\ \sin(\phi) & \cos(\phi) \end{pmatrix} = R_{B,B'}(\phi)$$

Testing:

$$b_1' = R_{B,B'}(\phi) \cdot b_1$$

$$= \begin{pmatrix} \cos(\phi) \\ \sin(\phi) \end{pmatrix} = \begin{pmatrix} \cos(\phi) & -\sin(\phi) \\ \sin(\phi) & \cos(\phi) \end{pmatrix} \times \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$b_2' = R_{B,B'}(\phi) \cdot b_2 = \begin{pmatrix} -\sin(\phi) \\ \cos(\phi) \end{pmatrix} = \begin{pmatrix} \cos(\phi) & -\sin(\phi) \\ \sin(\phi) & \cos(\phi) \end{pmatrix} \times \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$