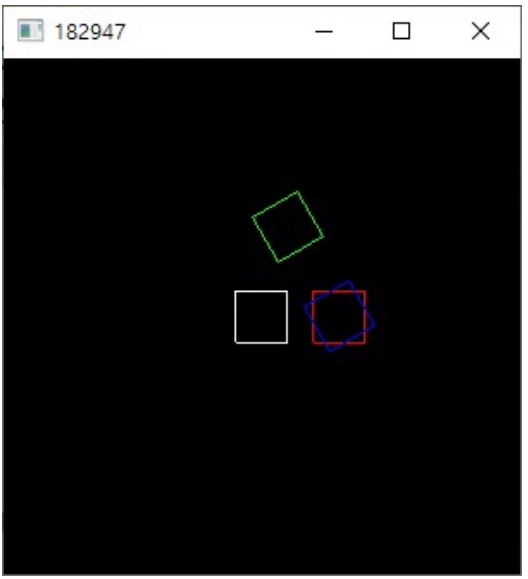
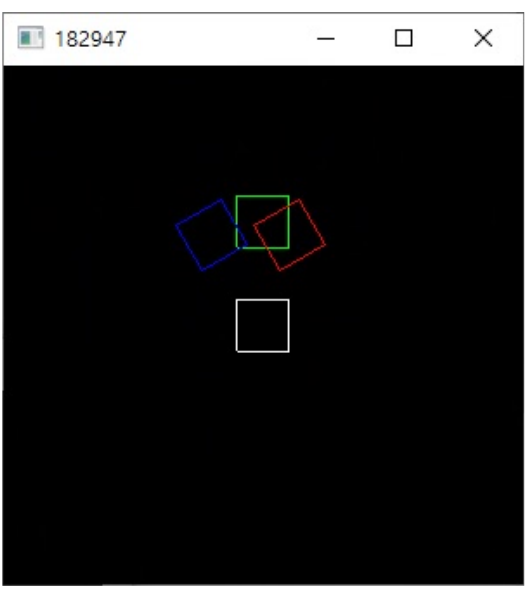
Hw2-1

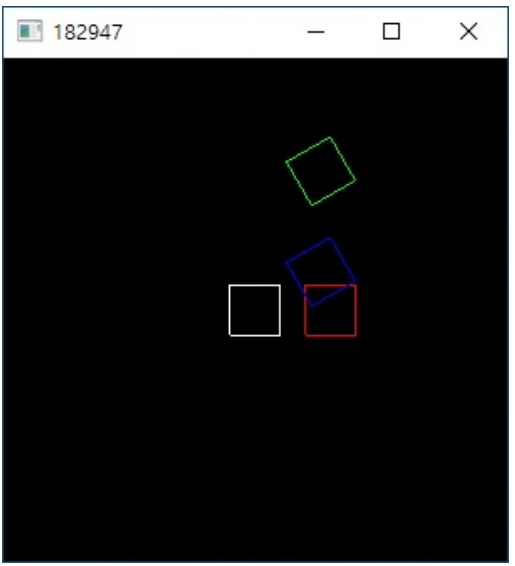
182947 강창우



Hw2-2-1



Hw 2-2-2



Hw 2-3-1

$$R_1(\theta) = \begin{vmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{vmatrix} \qquad R_2(\phi) = \begin{vmatrix} \cos\phi & -\sin\phi & 0 \\ \sin\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

① $R(\theta+\phi) = R_1(\theta) \cdot R_2(\phi)$

$$R_1(\theta) \cdot R_2(\phi) = \begin{vmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{vmatrix} \cdot \begin{vmatrix} \cos\phi & -\sin\phi & 0 \\ \sin\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} \cos\theta\cdot\cos\phi - \sin\theta\cdot\sin\phi & -\cos\theta\cdot\sin\phi - \sin\theta\cdot\cos\theta & 0 \\ \sin\theta\cdot\cos\phi + \cos\theta\cdot\sin\phi & -\sin\theta\cdot\sin\phi + \cos\theta\cdot\cos\phi & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

② $R(\theta+\phi) = R_2(\phi) \cdot R_1(\theta)$

$$R_2(\phi) \cdot R_1(\theta) = \begin{vmatrix} \cos\phi & -\sin\phi & 0 \\ \sin\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{vmatrix} \cdot \begin{vmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

$$= \begin{bmatrix} \cos\theta\cdot\cos\phi - \sin\theta\cdot\sin\phi & -\sin\theta\cdot\cos\phi - \cos\theta\cdot\sin\phi & 0 \\ \cos\theta\cdot\sin\phi + \sin\theta\cdot\cos\phi & -\sin\theta\cdot\sin\phi + \cos\theta\cdot\cos\phi & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\therefore \quad R_1(\theta)\cdot R_2(\phi) = R_2(\phi)\cdot R_1(\theta)$$

Hw 2-3-2

$P(1,2,3) \rightarrow (1,2,1)$ 만큼 이동 → y축으로 30도 회전.

$$P' = R\cdot T\cdot P$$

$T\cdot P$

↳

$$\begin{bmatrix} x' \\ y' \\ z \\ 1 \end{bmatrix} = \left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \\ \hline 0 & 0 & 0 & 1 \end{array}\right] \cdot \begin{bmatrix} 1 \\ 2 \\ 3 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1+1 \\ 2+2 \\ 3+1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ 4 \\ 1 \end{bmatrix}$$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\sin 30^\circ = \frac{1}{2}$

$P' = R \cdot (T \cdot P)$

↳ $R_y(\theta)$ (Pitch) → $\begin{vmatrix} \cos(30^\circ) & 0 & \sin(30^\circ) \\ 0 & 1 & 0 \\ -\sin(30^\circ) & 0 & \cos(30^\circ) \end{vmatrix}$

$$P' = \left|\begin{array}{cccc} \frac{\sqrt{3}}{2} & 0 & \frac{1}{2} & 0 \\ 0 & 1 & 0 & 0 \\ -\frac{1}{2} & 0 & \frac{\sqrt{3}}{2} & 0 \\ 0 & 0 & 0 & 1 \end{array}\right| \cdot \left|\begin{array}{c} 2 \\ 4 \\ 4 \\ 1 \end{array}\right|$$

$$= \left|\begin{array}{c} \sqrt{3}+2 \\ 4 \\ -1+2\sqrt{3} \\ 1 \end{array}\right| = \left|\begin{array}{c} \sqrt{3}+2 \\ 4 \\ 2\sqrt{3}-1 \\ 1 \end{array}\right|$$

$\therefore P'(\sqrt{3}+2,\ 4,\ 2\sqrt{3}-1)$