

Write a code from scratch to perform  
 the following tasks on the two test samples:  
 [test1.png, test2.png]  
 [without using any libraries related to graphics]

① Scaling

[5 points]

$$\begin{bmatrix} b_x & 0 \\ 0 & b_y \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

$$(b_x, b_y) = (-1.75, -1.75)$$

$$(-1.5, 1)$$

$$(1, -1.5)$$

$$(1.75, 1.75)$$

$$(1.5, 1)$$

$$(1, 1.75)$$

② Shear

[5 points]

$$\begin{bmatrix} 1 & \tan\theta \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\theta = +60^\circ, +45^\circ, +30^\circ, +15^\circ, -15^\circ, -45^\circ, -60^\circ$$

③ Rotation

[5 points]

$$\begin{bmatrix} \cos\phi & -\sin\phi \\ \sin\phi & \cos\phi \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\theta = +60^\circ, +45^\circ, +30^\circ, +15^\circ, -15^\circ, -45^\circ, -60^\circ$$

④ Reflection

[5 points]

(about x-axis and y-axis)