

Homework assignment 1 - Solution

1a) `glLoadIdentity();`
`glTranslatef(-1,-1,0);`
`glScalef(1.0/320.0,1.0/240.0,1.0);`

1b) `glLoadIdentity();`
`glScalef(1.0/320.0,1.0/240.0,1.0);`
`glTranslatef(-320,-240,0);`

2a) Coordinates of tip of triangle -> (.5,2.5,0)

2b) Coordinates of tip of triangle -> (-1.707,1,0)

2c) Please note in OpenGL, post multiplication means
 $v' = A*B*C*v = A*(B*(C*v))$ where A,B,C occur are transformations that
occur in that order.
for this question -

$$v' = T * R(\text{angle1}) * T * R(\text{angle2}) * v$$

where,

$$T = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} \quad R(a) = \begin{bmatrix} \cos a & -\sin a & 0 \\ \sin a & \cos a & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

3a) `Translate(2,2)`
`Block('A')`
`Translate(-2,-2)`
`Rotate(90)`
`Block('B')`

3b) `Scale(2, 2)`
`Block('A')`
`Scale(.5, .5)`
`Translate(2, 0)`
`Block('B')`
`Translate(1, 0)`
`Scale(3, 3)`
`Block('C')`

3c) `Push`
`Scale(2,2)`
`Block('A')`

Pop
Push
Translate(2,0)
Block('B')
Pop
Push
Scale(3,3)
Translate(1,0)
Block('C')
Pop

- 4a) (1 0 1; 0 1 1; 0 0 1)
- 4b) (1 0 0; 0 1 1; 0 0 1)
- 4c) ($\frac{1}{4}$ 0 1; 0 $\frac{1}{3}$ 1; 0 0 1)
- 4d) (-1 0 3; 0 1 0; 0 0 1)