Computer Graphics, Lab Assignment 5

Handed out: April 3, 2019

Recommended due: 15:00, April 3, 2019

Hard due: 23:59, April 3, 2019 **(NO SCORE for late submissions!)**

Submit your assignment only through the GitLab.

1. Write down a Python program to draw rotating point p=(0.5, 0) and vector v=(0.5, 0) in a 2D space.

   A. Set the window title to **[studentID]-[assignment#]-[prob#]** and the window size to (480,480).

   B. Use the following render() and fill "# your implementation" parts to render p and v.

      i. Hint: Render the vector v as a line segment starting from the origin (0,0).

```
def render(M):
    glClear(GL_COLOR_BUFFER_BIT)
    glLoadIdentity()

    # draw cooridnate
    glBegin(GL_LINES)
    glColor3ub(255, 0, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([1.,0.]))
    glColor3ub(0, 255, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([0.,1.]))
    glEnd()

    glColor3ub(255, 255, 255)

    # draw point p
    glBegin(GL_POINTS)
    # your implementation
    glEnd()

    # draw vector v
    glBegin(GL_LINES)
    # your implementation
    glEnd()
```

   C. Expected result: Uploaded LabAssignment5-1.mp4

      i. Do not mind the initial angle.

   D. p and v should be t rad rotated when t seconds have elapsed since the program was

executed.

E. You need to somehow combine a rotation matrix and a translation matrix to produce the expected result.

F. Submit a single .py file - **[studentID]-[assignment#]-[prob#].py**

2. Write down a Python program to draw a transformed triangle and its local frame in a 3D space.

A. Set the window title to **[studentID]-[assignment#]-[prob#]** and the window size to (480,480).

B. Use the following drawFrame() and drawTriangle() to draw the frame and triangle:

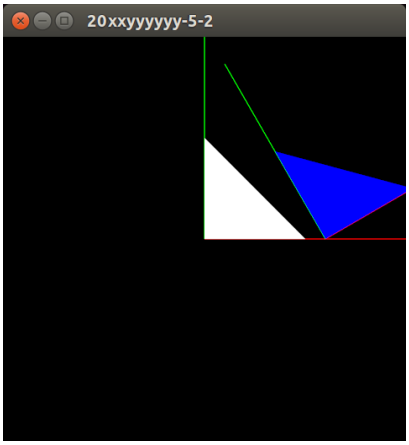
```
def drawFrame():
    glBegin(GL_LINES)
    glColor3ub(255, 0, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([1.,0.]))
    glColor3ub(0, 255, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([0.,1.]))
    glEnd()

def drawTriangle():
    glBegin(GL_TRIANGLES)
    glVertex2fv(np.array([0.,.5]))
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([.5,0.]))
    glEnd()
```

C. First draw an untransformed white triangle and a global frame.

D. Then draw a transformed blue triangle and its local frame. The triangle should be first rotated by 30 degrees and then translated by (0.6, 0, 0) **w.r.t. the global frame**.

E. Expected result:

i. 

F. Submit a single .py file - **[studentID]-[assignment#]-[prob#].py**