

Computer Graphics, Lab Assignment 3

Handed out: March 20, 2019

Recommended due: 15:00, March 20, 2019

Hard due: 23:59, March 20, 2019 **(NO SCORE for late submissions!)**

Submit your assignment only through the page of this course at learn.hanyang.ac.kr.

1. Write down a Python program to draw a rotating triangle.
 - A. Set the window title to **[studentID]-[assignment#]-[prob#]**. (e.g. **2017123456-3-1**) and the window size to (480,480).
 - B. Draw a triangle using `render()` function below (DO NOT modify it!).

```
def render(T):  
    glClear(GL_COLOR_BUFFER_BIT)  
    glLoadIdentity()  
    # draw coordinate  
    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()  
    # draw triangle  
    glBegin(GL_TRIANGLES)  
    glColor3ub(255, 255, 255)  
    glVertex2fv( (T @ np.array([.0,.5,1.]))[:-1] )  
    glVertex2fv( (T @ np.array([.0,.0,1.]))[:-1] )  
    glVertex2fv( (T @ np.array([.5,.0,1.]))[:-1] )  
    glEnd()
```

- C. Expected result: Uploaded LabAssignment3-1.mp4
 - i. Do not mind the initial angle of the triangle.
- D. The triangle 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**. (e.g. **2017123456-3-1.py**)

2. Write down a Python program to draw a transformed triangle.

A. Set the window title to **[studentID]-[assignment#]-[prob#]**.(e.g. **2017123456-3-2**) and the window size to (480,480).

B. Draw a triangle using render() function of prob 1 (DO NOT modify it!).

C. If you press or repeat a key, the triangle should be transformed as shown in the Table:

Key	Transformation
W	Scale by 0.9 times in x direction
E	Scale by 1.1 times in x direction
S	Rotate by 10 degrees counterclockwise
D	Rotate by 10 degrees clockwise
X	Shear by a factor of -0.1 in x direction
C	Shear by a factor of 0.1 in x direction
R	Reflection across x axis
1	Reset the triangle with identity matrix

D. Transformations should be accumulated (composed with previous one) unless you press '1'.

i. Be sure: `gComposedM = newM @ gComposedM`

ii. You'll need to make 'gComposedM' as a global variable.

E. Submit a single .py file - **[studentID]-[assignment#]-[prob#].py** (e.g. **2017123456-3-2.py**)

F. Expected result:

