

## Computer Graphics, Lab Assignment 8

Handed out: May 1, 2019

**Recommended due: 15:00**, May 1, 2019

**Hard due: 23:59**, May 1, 2019 **(NO SCORE for late submissions!)**

*Submit your assignment only through [hconnect.hanyang.ac.kr\(GitLab\)](https://hconnect.hanyang.ac.kr/GitLab).*

1. Write a program that draws a color-changing cube.

- A. Set the window title to **[studentID]-[assignment#]-[prob#]** and the window size to (480,480).
- B. Start from the code in 7-Lighting&Shading slides. Draw a flat-shaded cube. Make sure camera manipulation shortcuts '1', '3', '2', 'w' work.
- C. Use the following light setting:

```
lightPos = (3.,4.,5.,1.)
glLightfv(GL_LIGHT0, GL_POSITION, lightPos)

ambientLightColor = (.1,.1,.1,1.)
glLightfv(GL_LIGHT0, GL_AMBIENT, ambientLightColor)

specularObjectColor = (1.,1.,1.,1.)
glMaterialfv(GL_FRONT, GL_SPECULAR, specularObjectColor)

glMaterialfv(GL_FRONT, GL_SHININESS, 10)
```

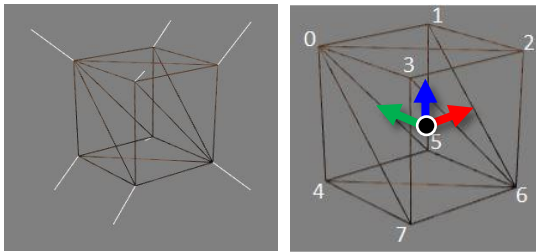
- D. If you press or repeat a key, the diffuse & specular color of the light and the ambient & diffuse color of the object should be changed as shown in the Table:

Key	Action
A	Change the light color to red
S	Change the light color to green
D	Change the light color to blue
F	Change the light color to white
Z	Change the object color to red
X	Change the object color to green
C	Change the object color to blue
V	Change the object color to white

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

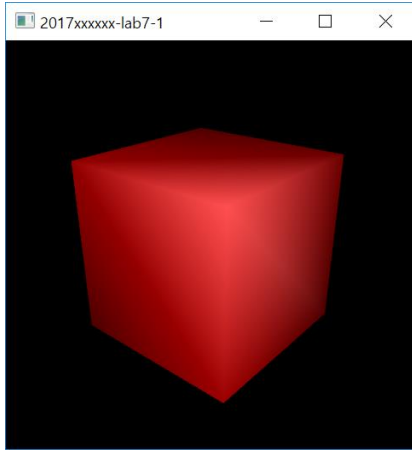
2. Write a program that draws a smooth-shaded cube.

- A. Set the window title to **[studentID]-[assignment#]-[prob#]** and the window size to (480,480).
- B. Start from the code in 8-Lighting&Shading slides. Make sure camera manipulation shortcuts '1', '3', '2', 'w' work.
- C. Use **glDrawElements()**, not **glDrawArray()**. Refer the code in 7-Hierarchy&Mesh slides.
  - i. Hint: In Gouraud shading, one vertex has only one normal. This makes using **glDrawElements()** easier.
- D. Use the following normal vector data:



vertex index	position	normal
0	( -1 , 1 , 1 )	( -0.5773502691896258 , 0.5773502691896258 , 0.5773502691896258 )
1	( 1 , 1 , 1 )	( 0.8164965809277261 , 0.4082482904638631 , 0.4082482904638631 )
2	( 1 , -1 , 1 )	( 0.4082482904638631 , -0.4082482904638631 , 0.8164965809277261 )
3	( -1 , -1 , 1 )	( -0.4082482904638631 , -0.8164965809277261 , 0.4082482904638631 )
4	( -1 , 1 , -1 )	( -0.4082482904638631 , 0.4082482904638631 , -0.8164965809277261 )
5	( 1 , 1 , -1 )	( 0.4082482904638631 , 0.8164965809277261 , -0.4082482904638631 )
6	( 1 , -1 , -1 )	( 0.5773502691896258 , -0.5773502691896258 , -0.5773502691896258 )
7	( -1 , -1 , -1 )	( -0.8164965809277261 , -0.4082482904638631 , -0.4082482904638631 )

- E. Expected result:



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