Computer Graphics, Lab Assignment 2

Handed out: March 14, 2022

Due: 23:59, March 18, 2022 (NO SCORE for late submissions!)

- *Only files submitted by **git push to this course project at https://hconnect.hanyang.ac.kr** (<Year>_<Course no.>_<Class code>/<Year>_<Course no.>_<Student ID>.git) will be scored.*
- *Place your files under the directory structure **<Assignment name>/<Problem no.>/<your files>** just like the following example.*

```
+ 2021_ITE0000_2019000001
  + LabAssignment2/
    + 1/
      - 1.py
    + 2/
      - 2.py
    + 3/
      - 3.py
```

- *The submission time is determined not when the commit is made **but when the git push is made**.*
- *Your files must be committed to the **master branch**. Otherwise, it will not be scored.*

1. Write down a Python program to:
   A. Create a 1d array M with values ranging from 5 to 21 and print M.
   B. Reshape M as a 4x4 matrix and print M.
   C. Set the value of "inner" elements of the matrix M to 0 and print M.
   D. Assign M^2 to the M and print M.
   E. Let's call the first row of the matrix M a vector v. Calculate the magnitude of the vector v and print it.
      i. Hint: $\|\mathbf{x}\| = \sqrt{(x_1^2 + x_2^2 + \cdots + x_n^2)}$

ii. Hint: Use np.sqrt()

F. Files to submit: A Python source file (Name the file whatever you want (in English). Extension should be .py))

Expected output:

```
[ 5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20]

[[ 5  6  7  8]
 [ 9 10 11 12]
 [13 14 15 16]
 [17 18 19 20]]

[[ 5  6  7  8]
 [ 9  0  0 12]
 [13  0  0 16]
 [17 18 19 20]]

[[ 306  174  187  384]
 [ 249  270  291  312]
 [ 337  366  395  424]
 [ 834  462  499 1056]]

553.4771901352394
```

2. Write down a Python program to draw a rectangular polygon.

A. Set the window title to **your student ID** and the window size to (480,480).

B. The width and height of the rectangle are 1.0.

C. The 4 vertices should be specified counterclockwise.

D. When the program starts, the vertices are connected with GL_LINE_LOOP.

E. If the keys 1, 2, 3, … 9, 0 are entered, the primitive type should be changed.

i. Hint: Use a global variable to store the primitive type

Key	Primitive Type
1	GL_POINTS
2	GL_LINES
3	GL_LINE_STRIP
4	GL_LINE_LOOP
5	GL_TRIANGLES
6	GL_TRIANGLE_STRIP
7	GL_TRIANGLE_FAN
8	GL_QUADS

9	GL_QUAD_STRIP
10	GL_POLYGON

A. Files to submit: A Python source file (Name the file whatever you want (in English). Extension should be .py))

3.