How to compile and run the program:

Step 1:

Open the terminal and go to the unzipped folder (Rotate-Sphere-Shading)

Step 2:

Run the commands below to generate the Makefile ($ stands for the terminal prompt).

Note that the folder already had the build file as well as 4 sphere files in it, so you may skip the below steps and go to the build folder directly.

$mkdir build

$cd build

$make

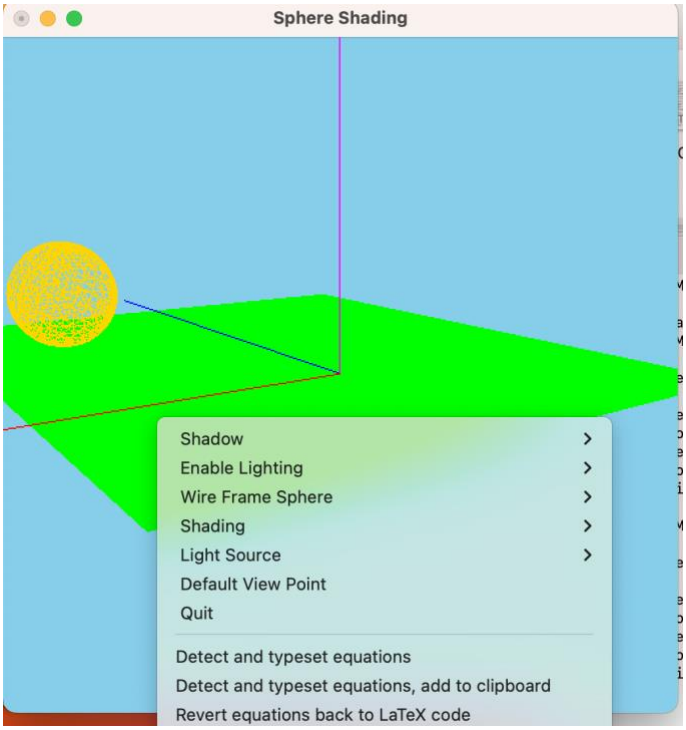
Step 3:

To run the program in the command line below, then type in the file name when prompted:

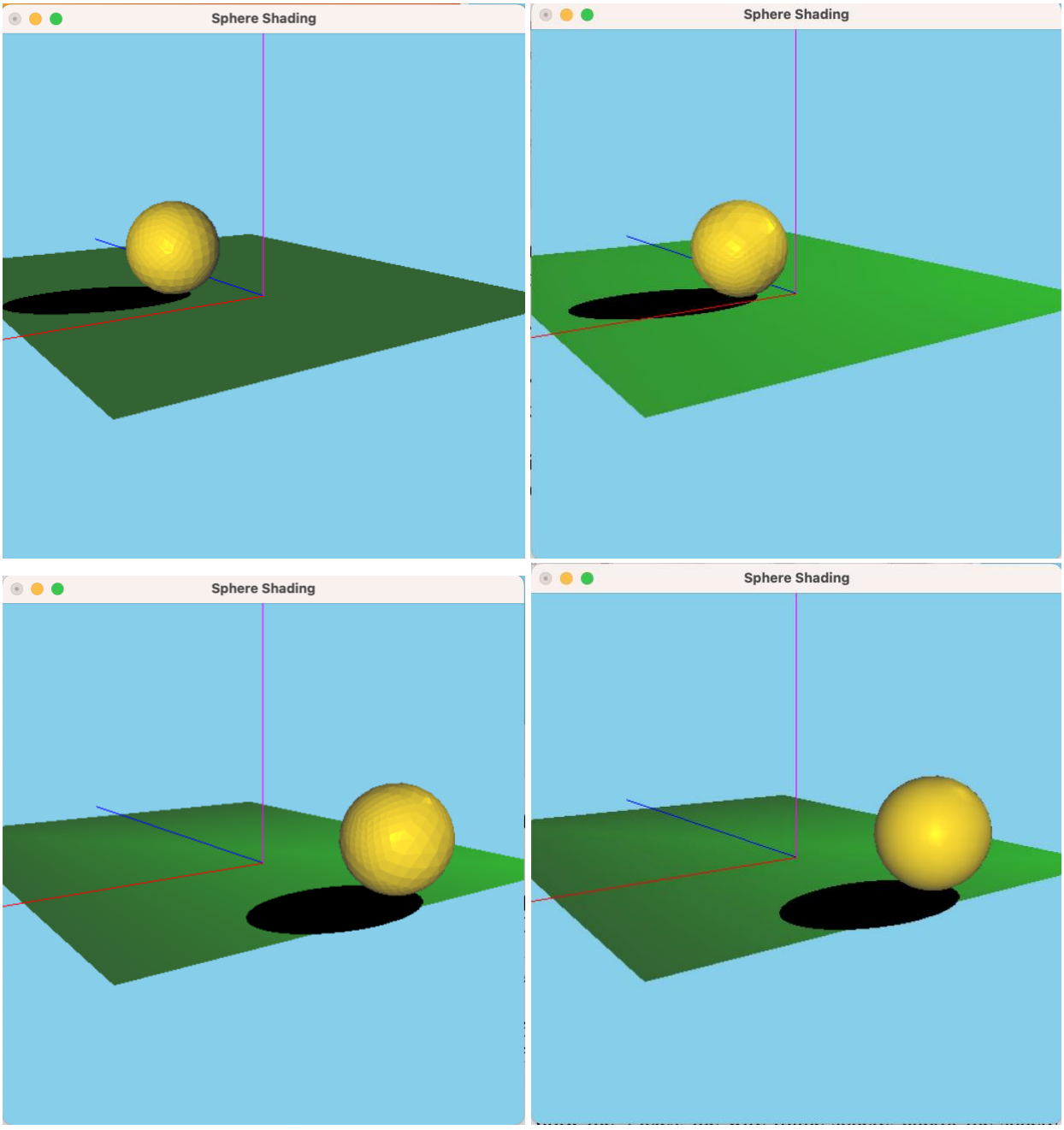
$./RotateSphereShading

```
(base) zijing@MacBook-Pro ~ % cd /Users/zijing/Desktop/Graphics/Rotate-Sphere-Shading/build
(base) zijing@MacBook-Pro build % make
[ 33%] Linking CXX executable RotateSphereShading
[100%] Built target RotateSphereShading
(base) zijing@MacBook-Pro build % ./RotateSphereShading
what filename? sphere.1024
Renderer: Apple M2 Max
OpenGL version supported 4.1 Metal - 83.1
Successfully read vshader53.glsl
Successfully compiled vshader53.glsl
Successfully read fshader53.glsl
Successfully compiled fshader53.glsl
Successfully linked program object
```

The sphere is wireframe with no lighting initially, and we can draw a solid sphere, produce shadow or enable lighting based on the menu shown in the figure below.



For part c, when “Enable Lighting” is “Yes”, the initial lighting type is global light and distant light. Then the submenu “Light Source” allows you to switch between “Point Source” and “Spot Light”. Also, we can decide the shading effect.



In Mac, the line “ # include <GLUT/freeglut_ext.h>” cannot work which would cause errors. So I comment out this line in the file "Angel-yjc.h" and “glutSetMenuFont(menu_ID, GLUT_BITMAP_HELVETICA_18);” in the file “rotate-sphere.cpp”.