UCS1712 – GRAPHICS AND MULTIMEDIA LAB

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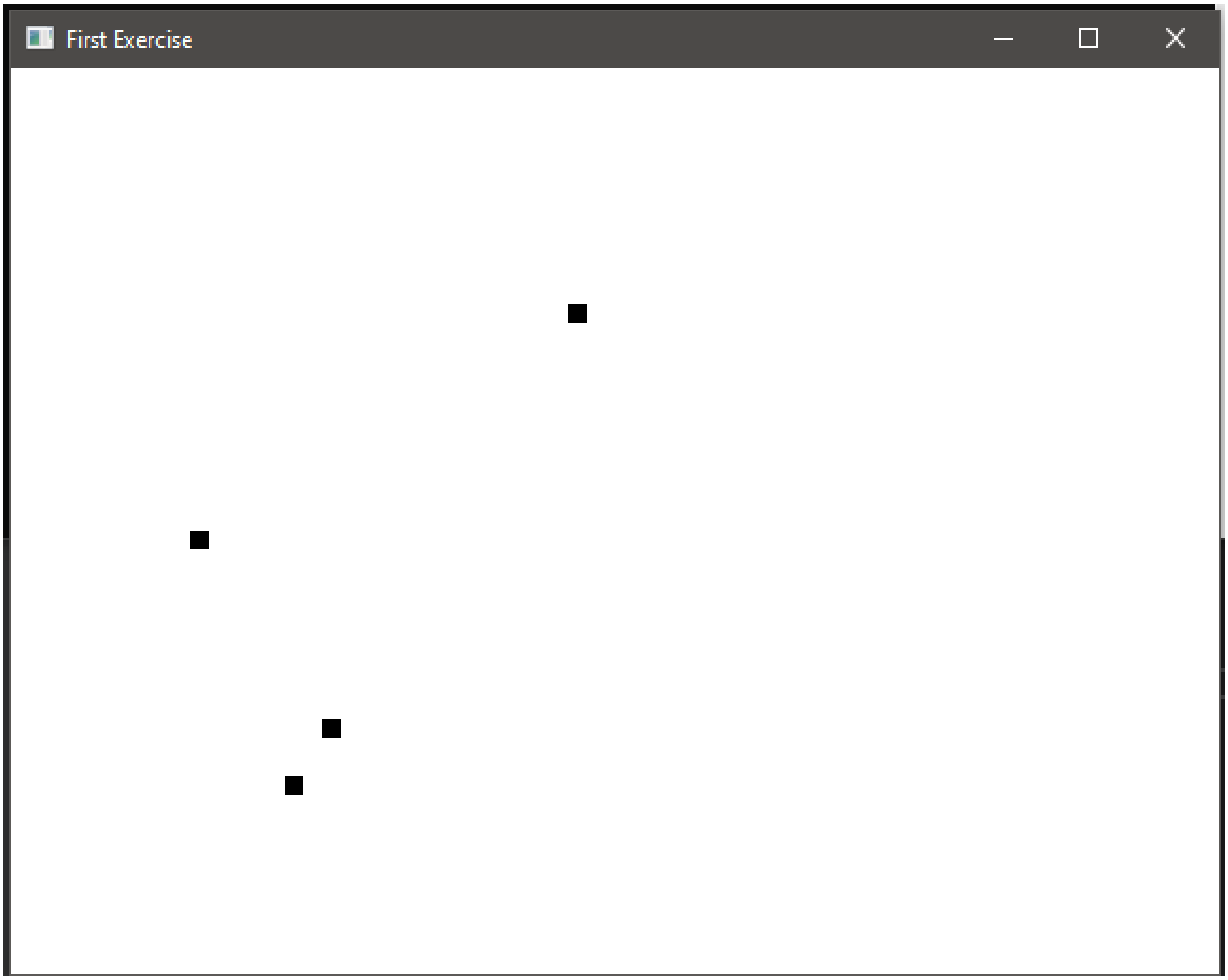
Lab Exercise 1 : Study of Basic Output Primitives in C++ using OpenGL
a). To create an output window using OPENGL and to draw the following basic output primitives –

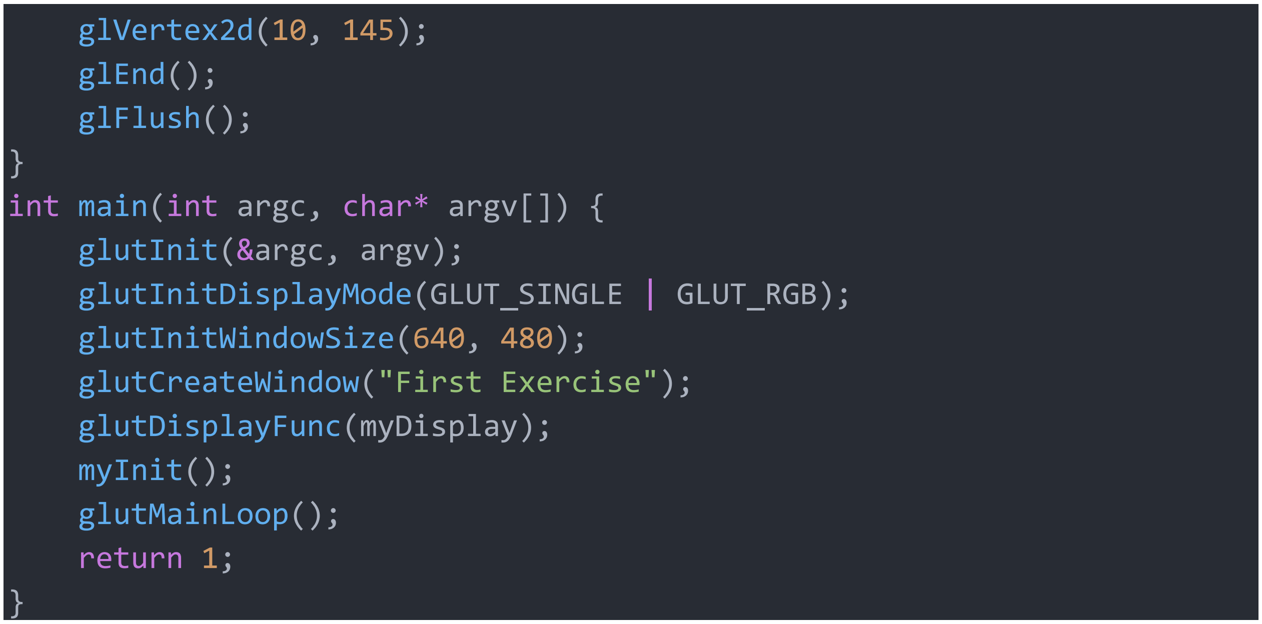
- POINTS

```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_POINTS);
    glVertex2d(150, 100);
    glVertex2d(100, 230);
    glVertex2d(170, 130);
    glVertex2d(300, 350);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

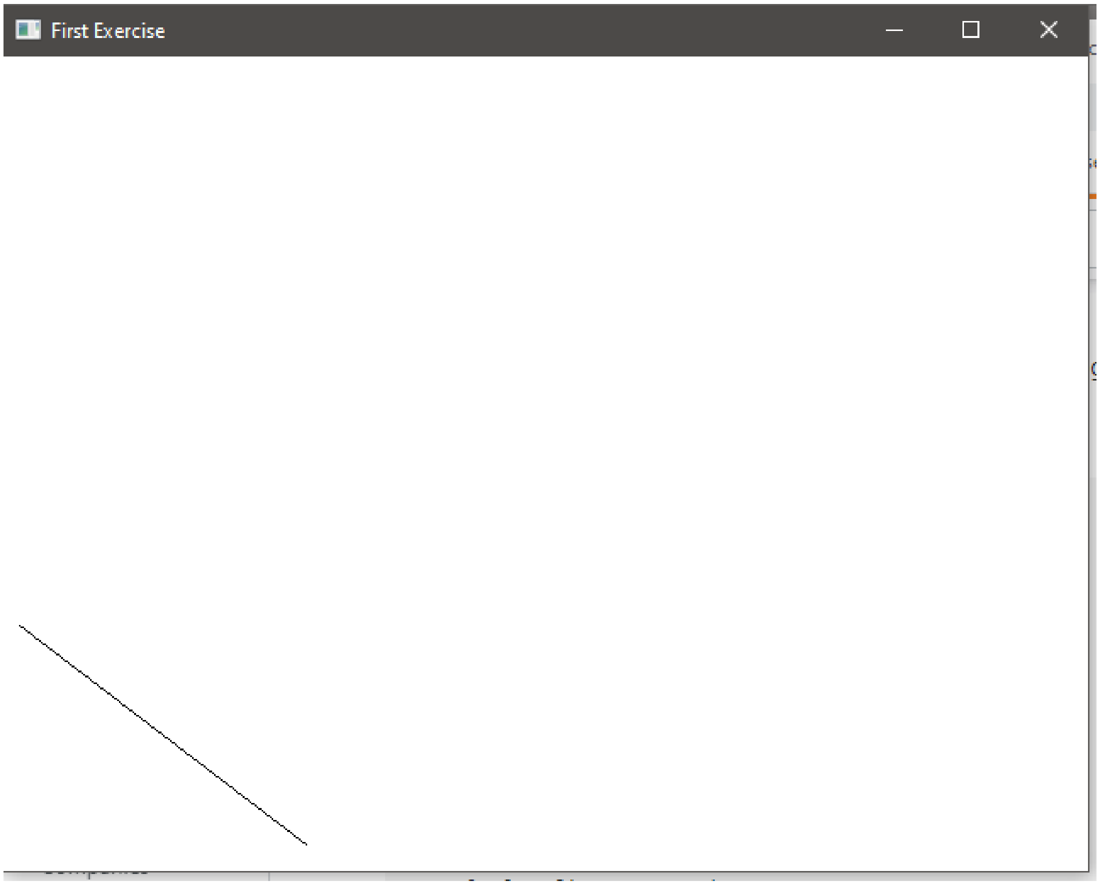


- LINES

```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_LINES);
    glVertex2d(180, 15);
```

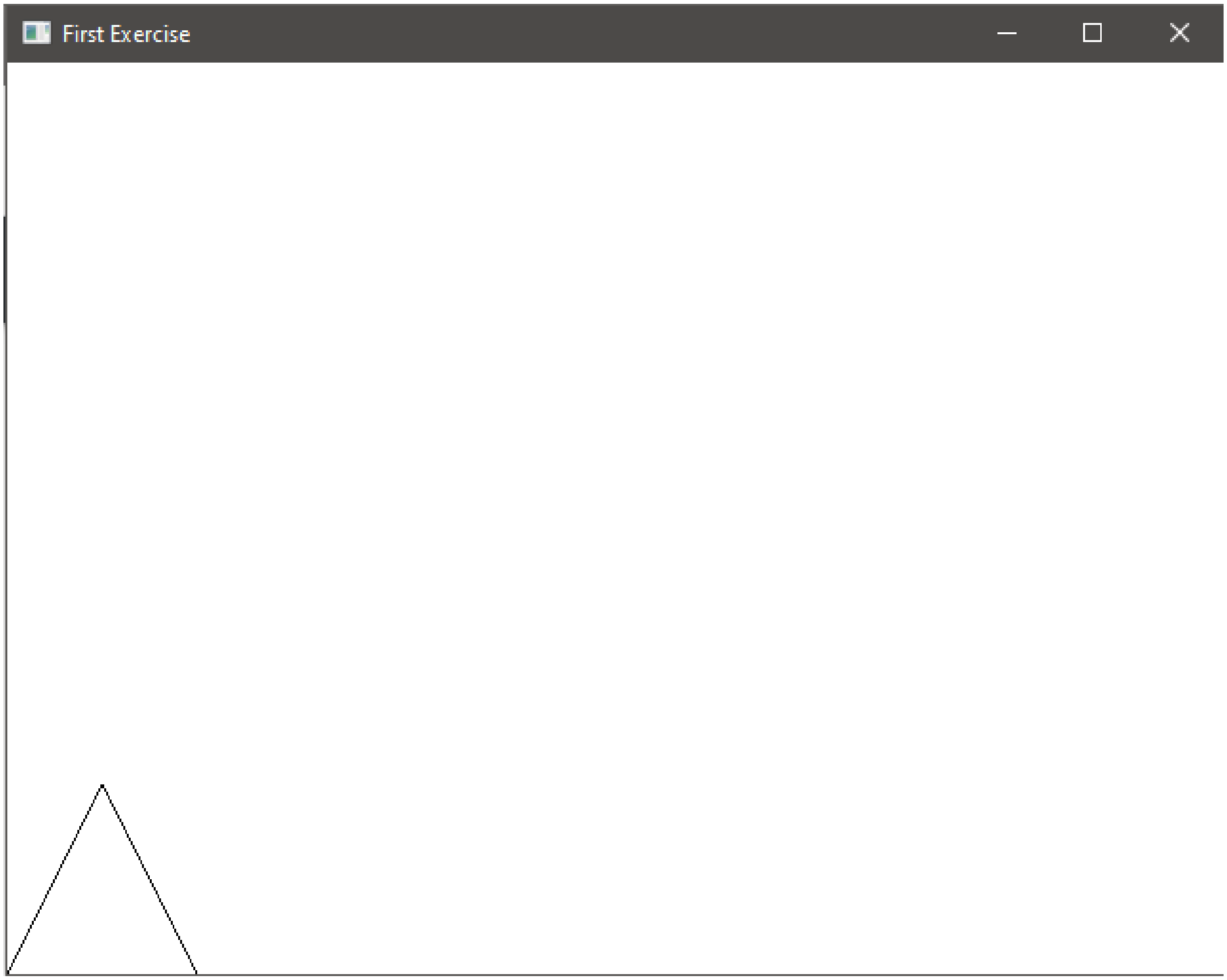


```
    glVertex2d(10, 145);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```



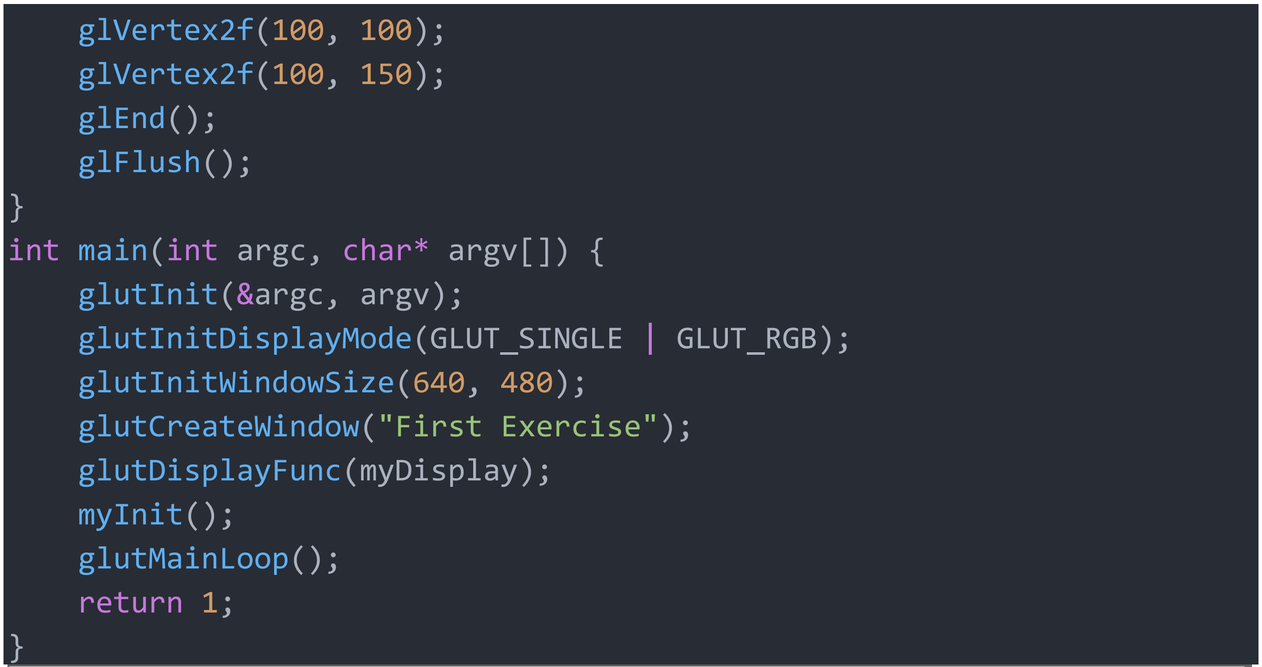
- LINE_STRIP

```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_LINE_STRIP);
    glVertex2f(0, 0);
    glVertex2f(50, 100);
    glVertex2f(50, 100);
    glVertex2f(100, 0);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

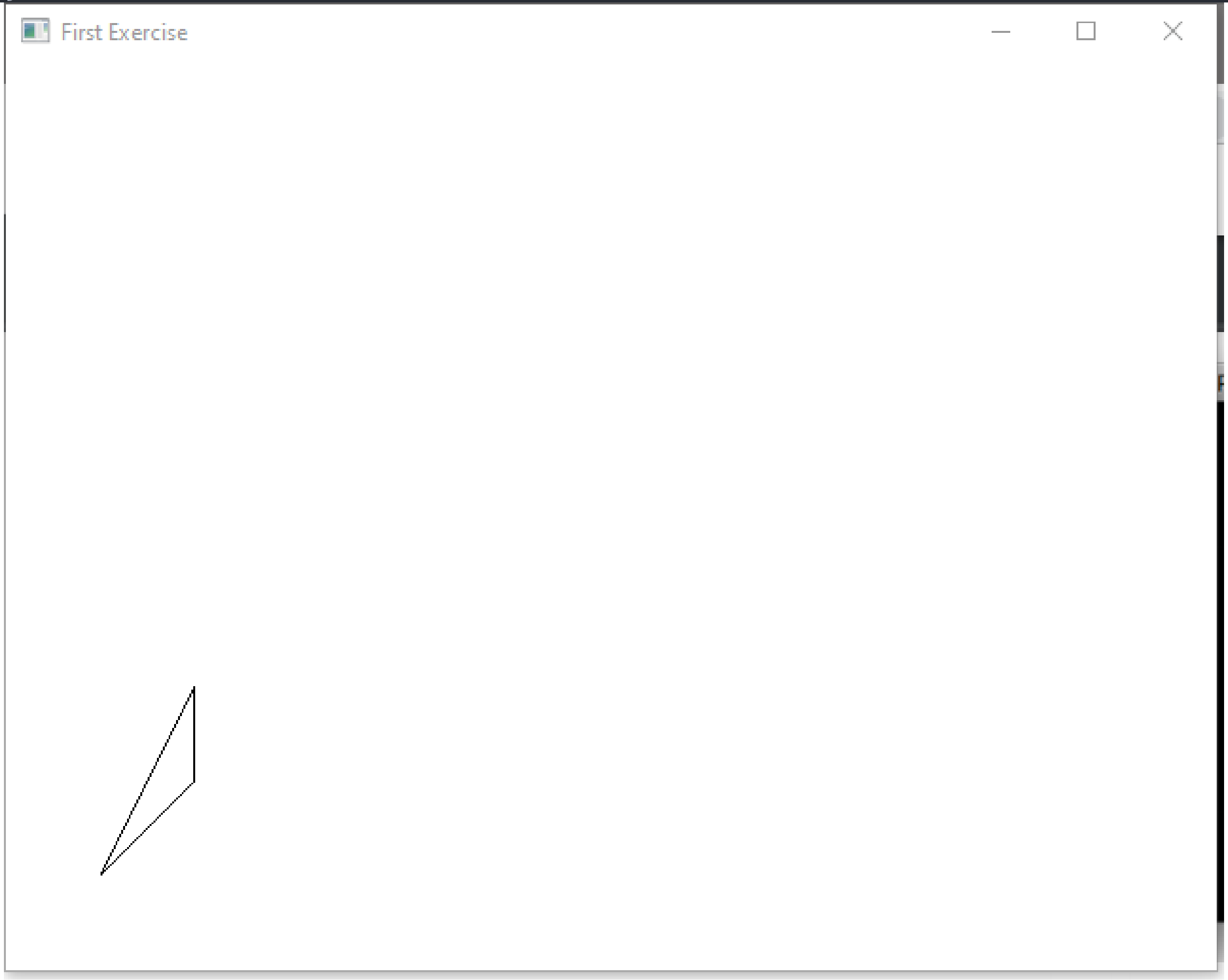


- LINE_LOOP

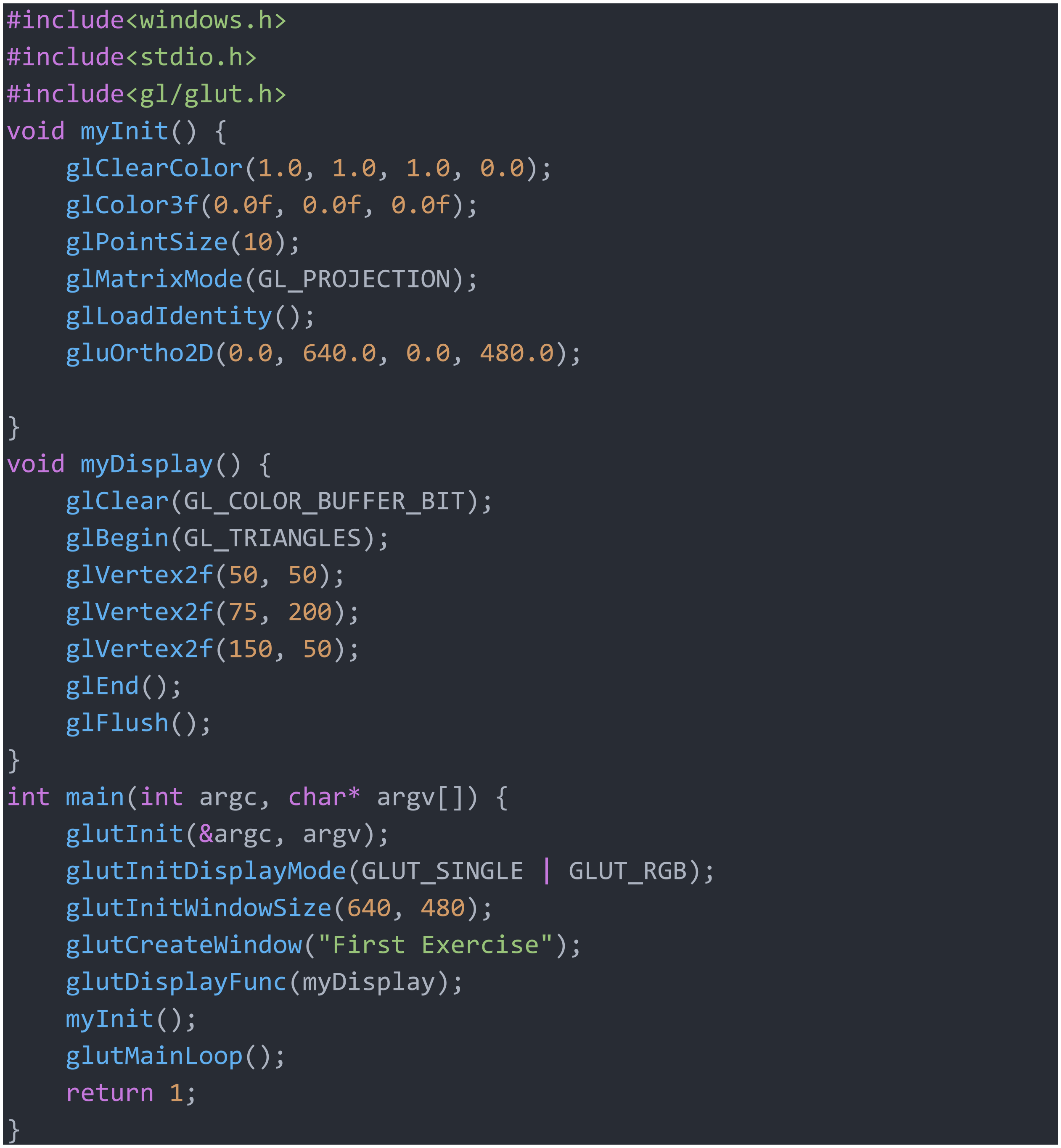
```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_LINE_LOOP);
    glVertex2f(50, 50);
```



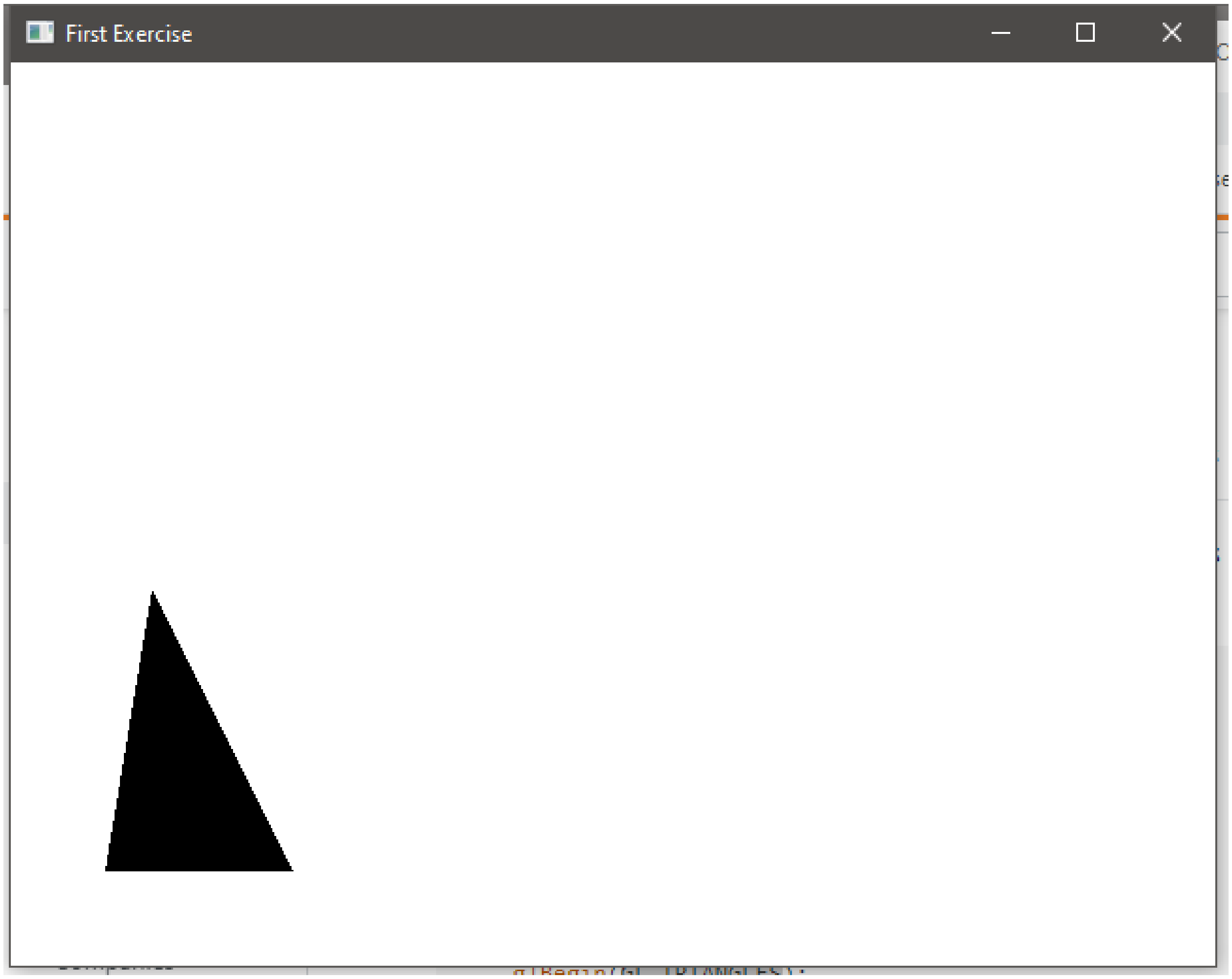
```
    glVertex2f(100, 100);
    glVertex2f(100, 150);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```



- TRIANGLES

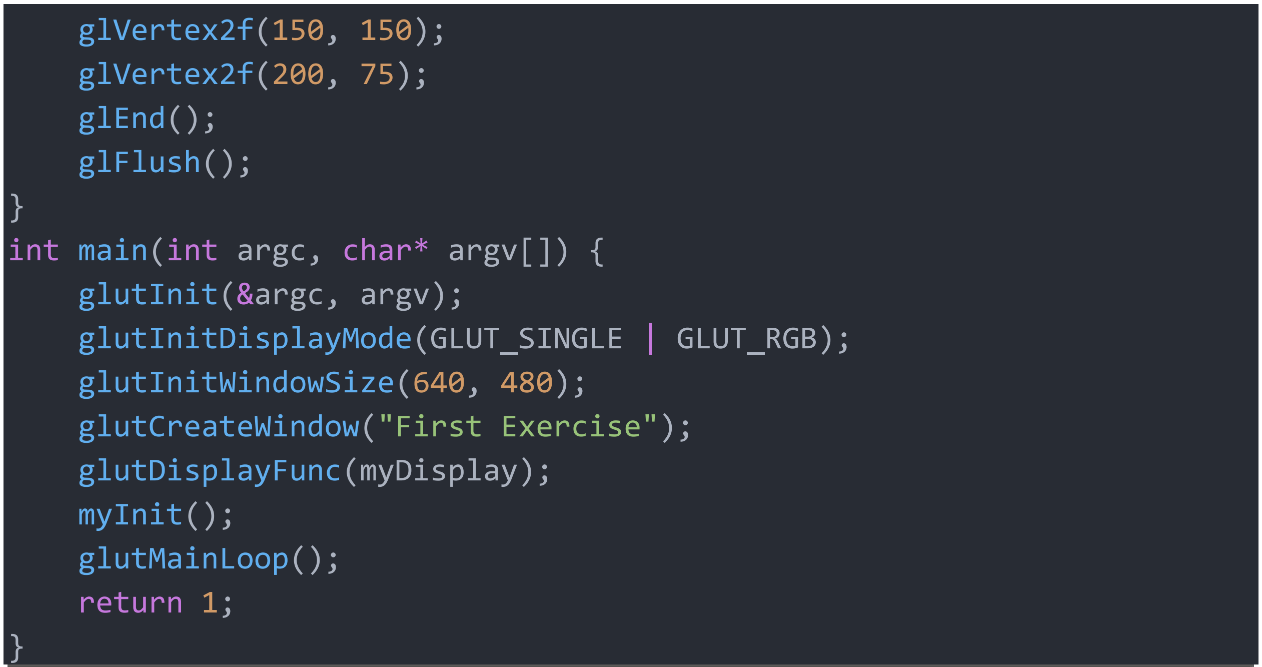


```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_TRIANGLES);
    glVertex2f(50, 50);
    glVertex2f(75, 200);
    glVertex2f(150, 50);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

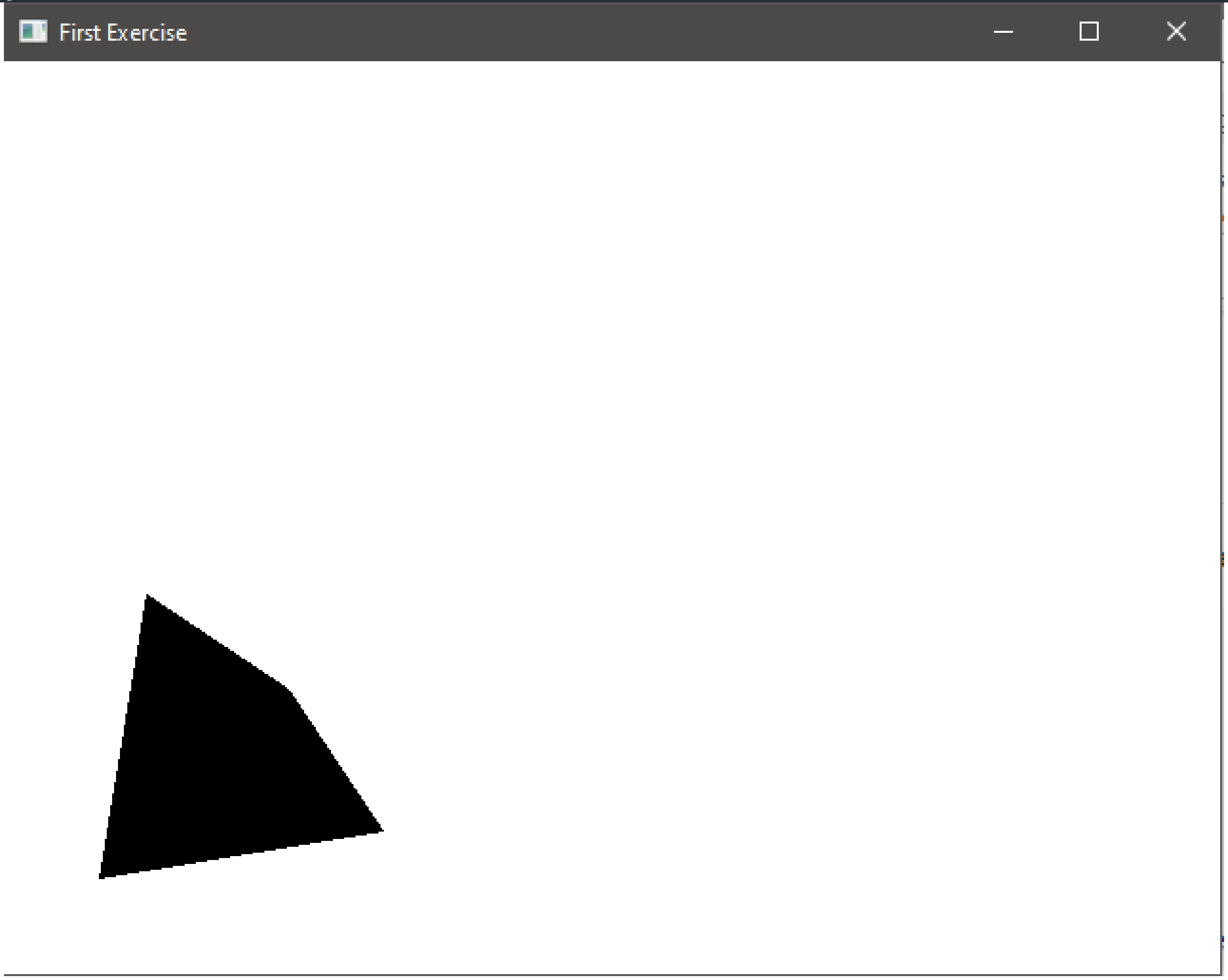


- QUADS

```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_QUADS);
    glVertex2f(50, 50);
    glVertex2f(75, 200);
```

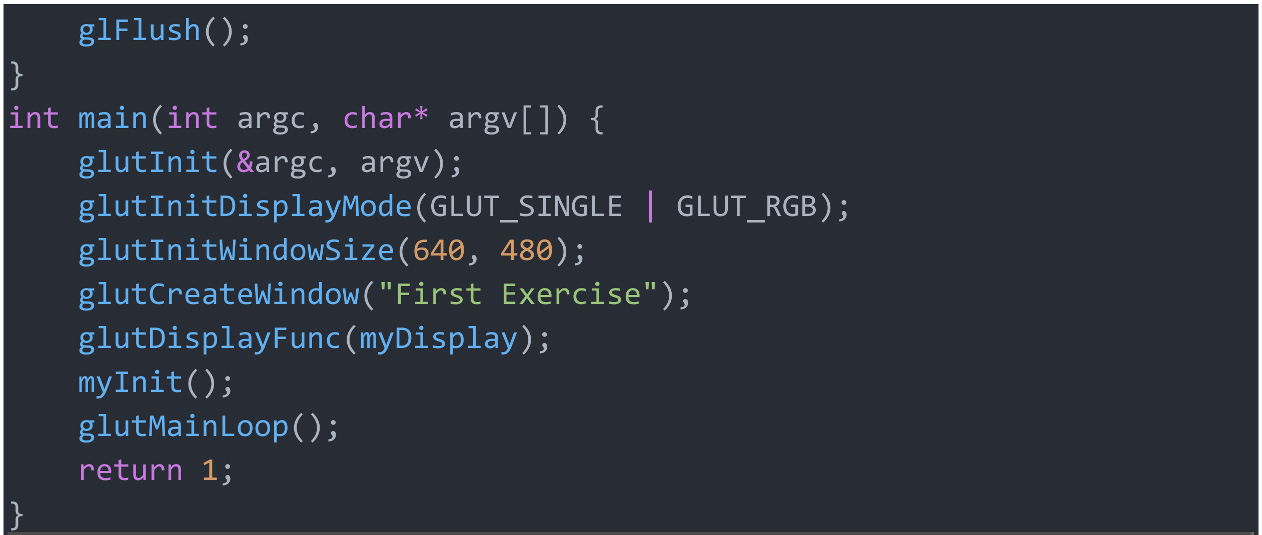


```
    glVertex2f(150, 150);
    glVertex2f(200, 75);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

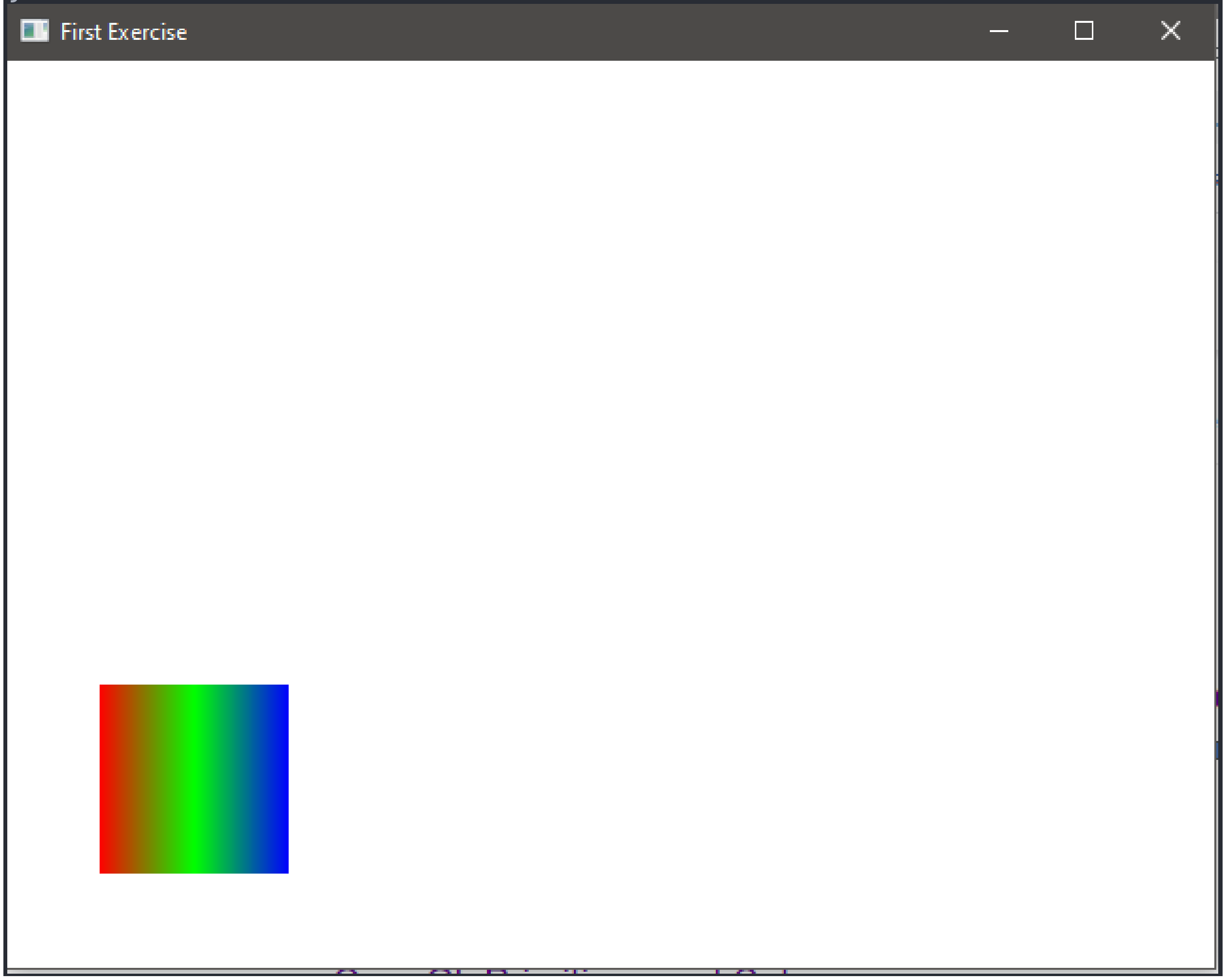


- QUAD_STRIP

```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    for (int j = 1; j <= 8; j++) {
        for (int i = 1; i <= 8; i ++) {
            glBegin(GL_QUADS);
            if ((i + j) % 2 == 0) {
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f(i * 50, j * 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f(i * 50, (j * 50) + 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f((i * 50) + 50, (j * 50) + 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f((i * 50) + 50, j * 50);
            }
            else {
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f(i * 50, j * 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f(i * 50, (j * 50) + 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f((i * 50) + 50, (j * 50) + 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f((i * 50) + 50, j * 50);
            }
            glEnd();
        }
    }
```

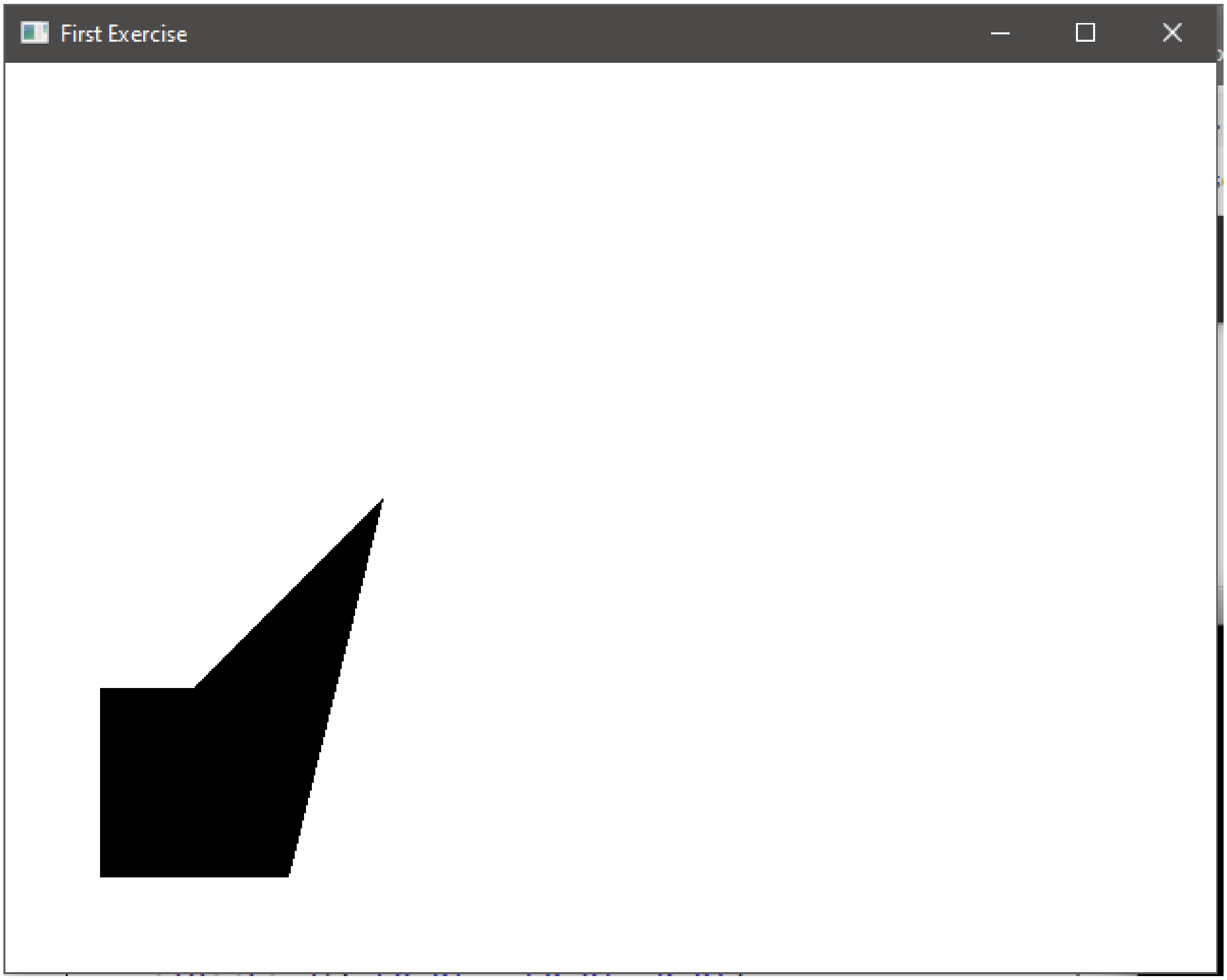


```
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

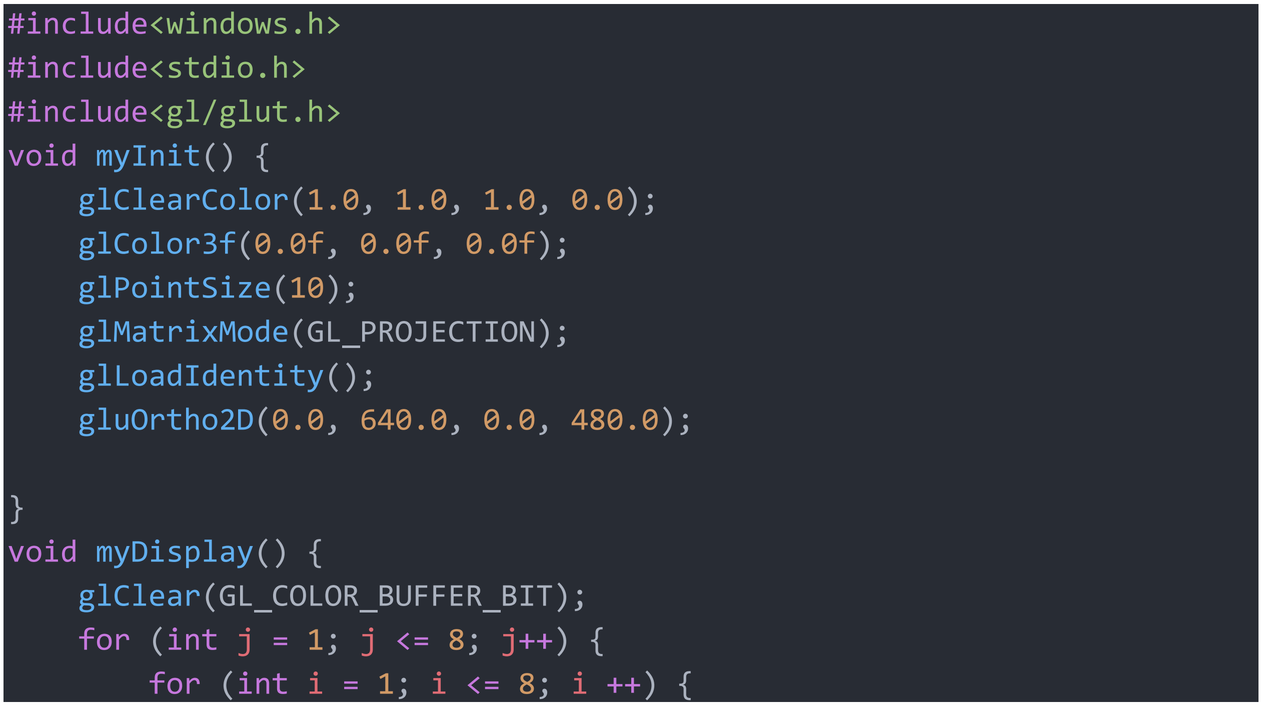


- POLYGON

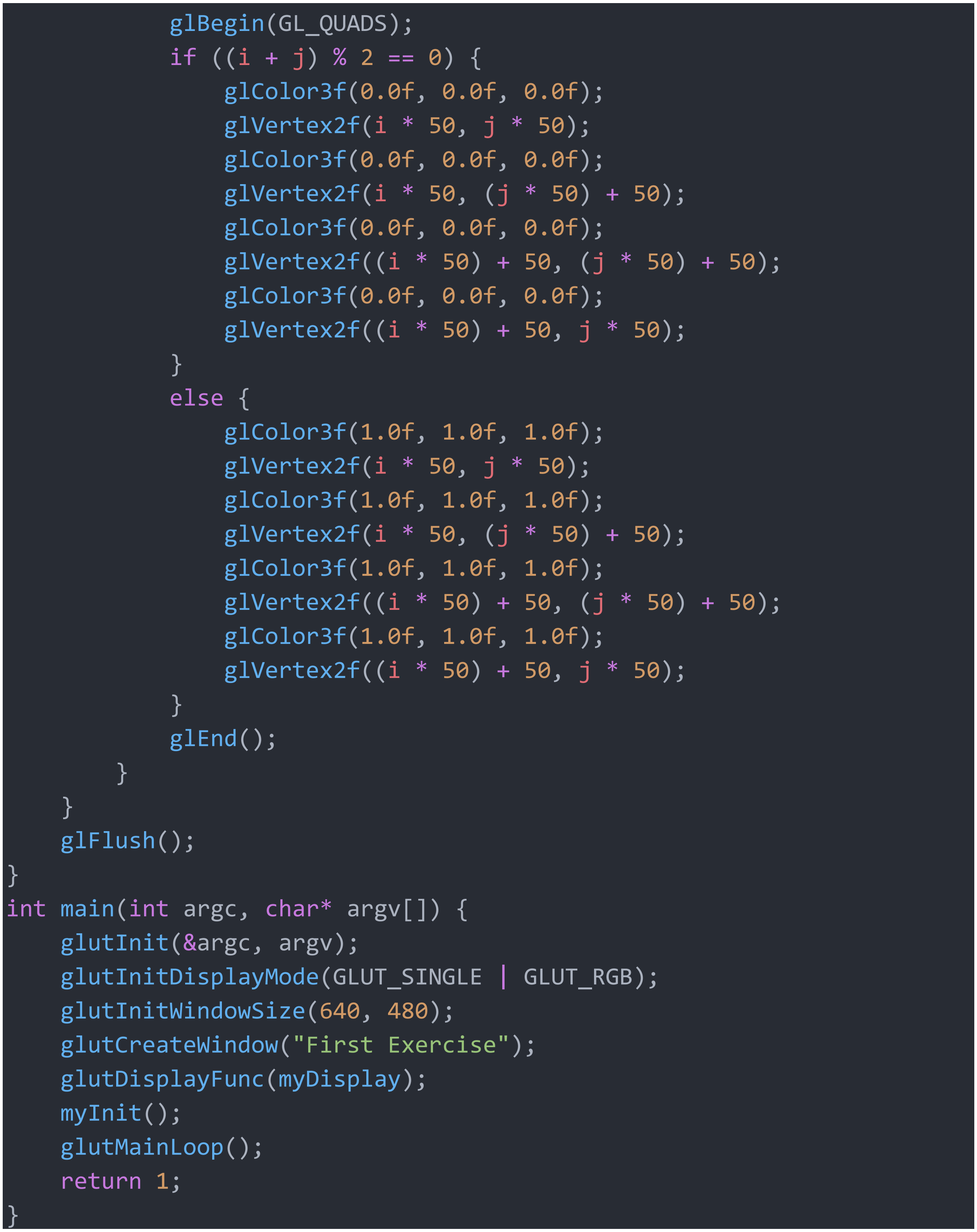
```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_POLYGON);
    glVertex2f(50, 50);
    glVertex2f(50, 150);
    glVertex2f(100, 150);
    glVertex2f(200, 250);
    glVertex2f(150, 50);
    glVertex2f(150, 150);
    glEnd();
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```



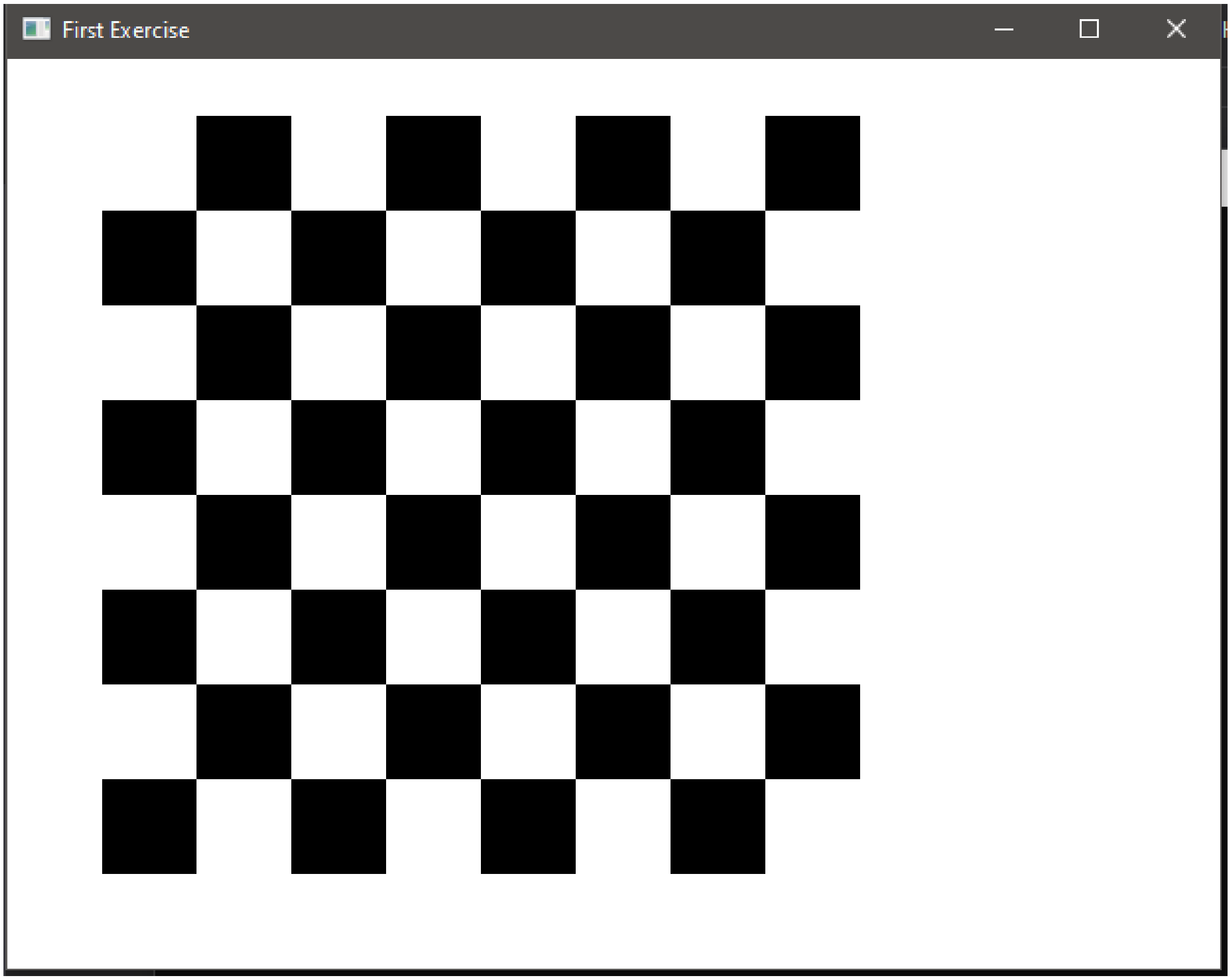
b) To create an output window and draw a checkerboard using OpenGL.



```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    for (int j = 1; j <= 8; j++) {
        for (int i = 1; i <= 8; i ++) {
```

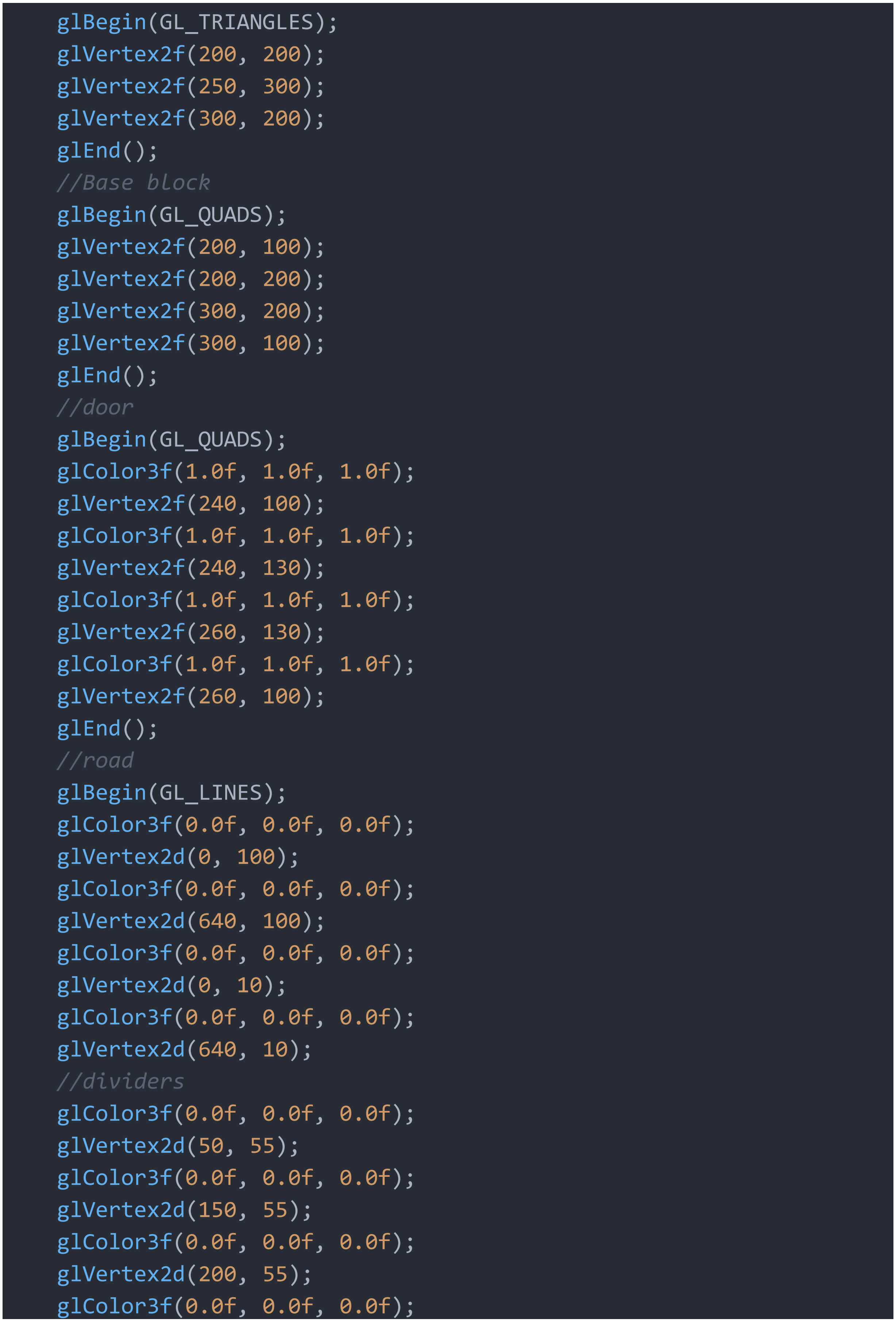


```
            glBegin(GL_QUADS);
            if ((i + j) % 2 == 0) {
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f(i * 50, j * 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f(i * 50, (j * 50) + 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f((i * 50) + 50, (j * 50) + 50);
                glColor3f(0.0f, 0.0f, 0.0f);
                glVertex2f((i * 50) + 50, j * 50);
            }
            else {
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f(i * 50, j * 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f(i * 50, (j * 50) + 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f((i * 50) + 50, (j * 50) + 50);
                glColor3f(1.0f, 1.0f, 1.0f);
                glVertex2f((i * 50) + 50, j * 50);
            }
            glEnd();
        }
    }
    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```

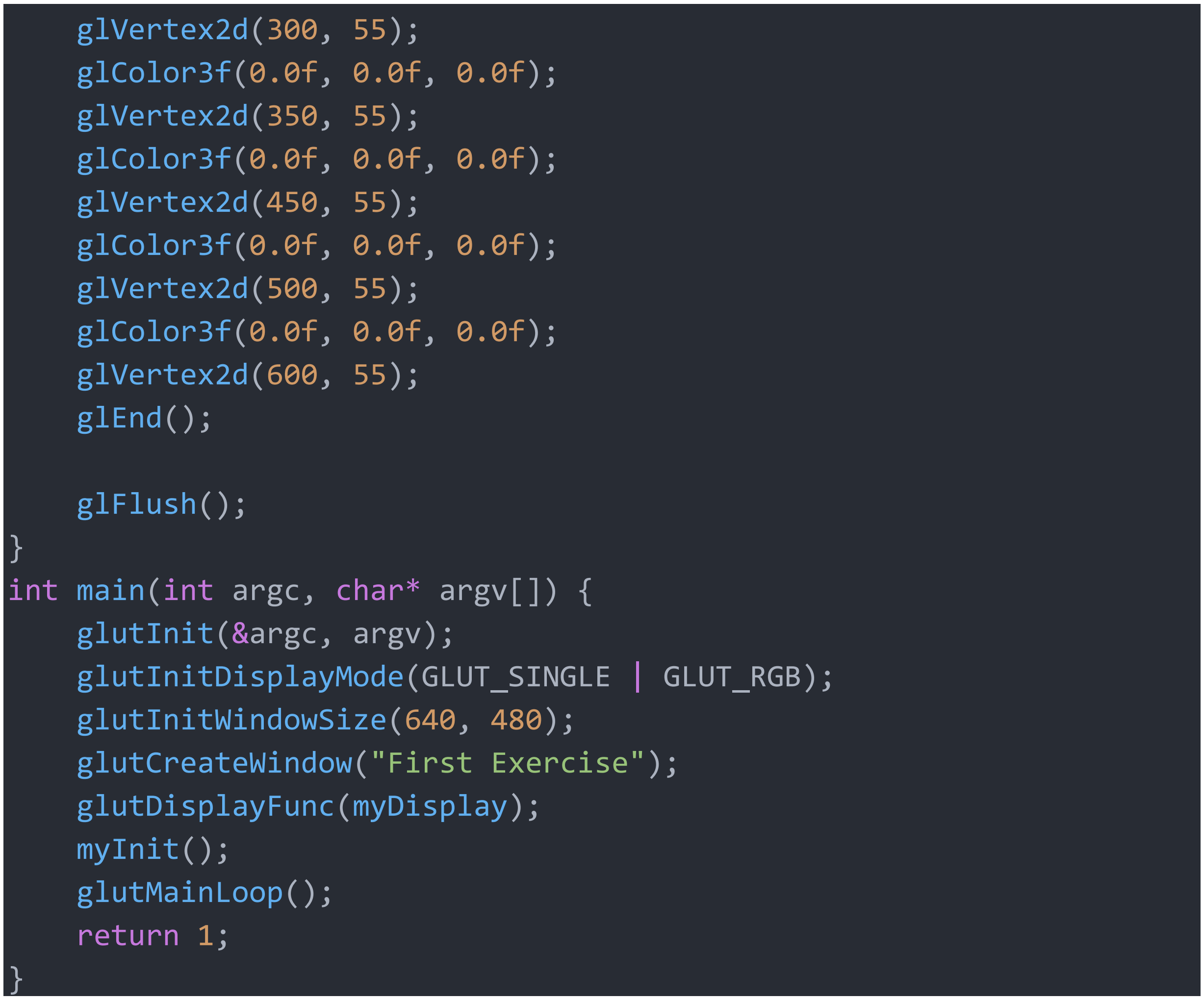


c) To create an output window and draw a house using POINTS,LINES,TRAINGLES and QUADS/POLYGON.

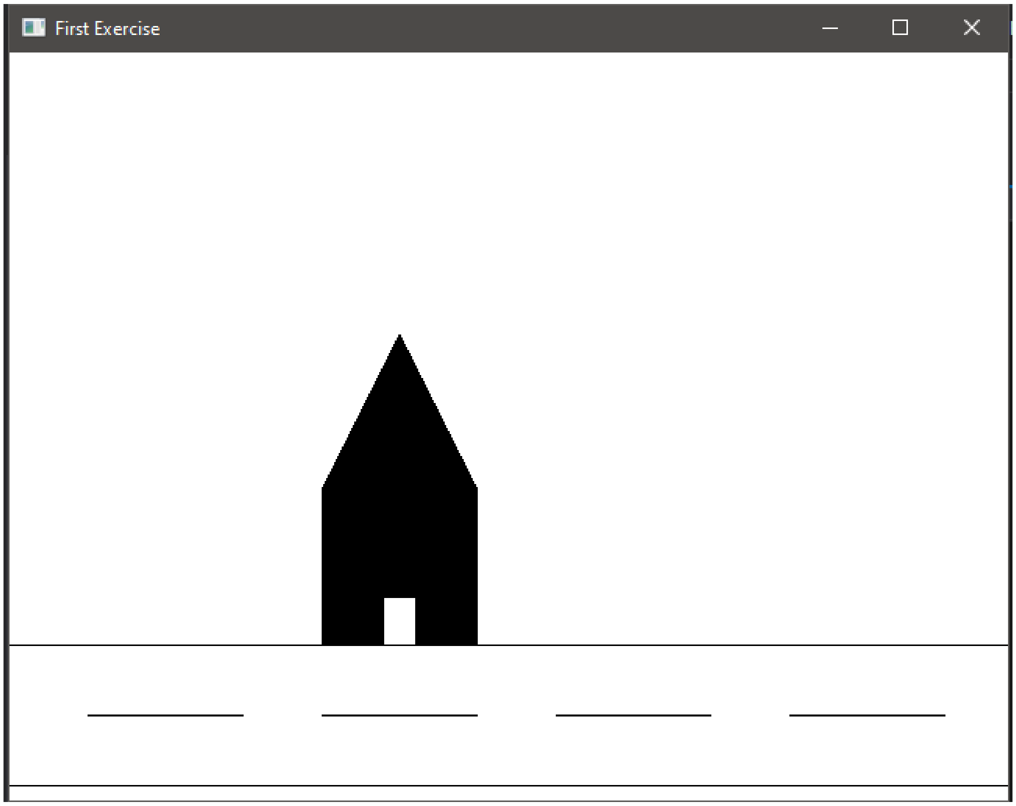
```
#include<windows.h>
#include<stdio.h>
#include<gl/glut.h>
void myInit() {
    glClearColor(1.0, 1.0, 1.0, 0.0);
    glColor3f(0.0f, 0.0f, 0.0f);
    glPointSize(10);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0, 640.0, 0.0, 480.0);

}
void myDisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    //Roof triangle
```



```
    glBegin(GL_TRIANGLES);
    glVertex2f(200, 200);
    glVertex2f(250, 300);
    glVertex2f(300, 200);
    glEnd();
    //Base block
    glBegin(GL_QUADS);
    glVertex2f(200, 100);
    glVertex2f(200, 200);
    glVertex2f(300, 200);
    glVertex2f(300, 100);
    glEnd();
    //door
    glBegin(GL_QUADS);
    glColor3f(1.0f, 1.0f, 1.0f);
    glVertex2f(240, 100);
    glColor3f(1.0f, 1.0f, 1.0f);
    glVertex2f(240, 130);
    glColor3f(1.0f, 1.0f, 1.0f);
    glVertex2f(260, 130);
    glColor3f(1.0f, 1.0f, 1.0f);
    glVertex2f(260, 100);
    glEnd();
    //road
    glBegin(GL_LINES);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(0, 100);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(640, 100);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(0, 10);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(640, 10);
    //dividers
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(50, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(150, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(200, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
```



```
    glVertex2d(300, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(350, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(450, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(500, 55);
    glColor3f(0.0f, 0.0f, 0.0f);
    glVertex2d(600, 55);
    glEnd();

    glFlush();
}
int main(int argc, char* argv[]) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(640, 480);
    glutCreateWindow("First Exercise");
    glutDisplayFunc(myDisplay);
    myInit();
    glutMainLoop();
    return 1;
}
```


First Exercise