

Exercises for Advanced Graphics (Lectures 1-4)

All work to be submitted by email in a single PDF, no less than 48 hours before supervision.

In this exercise you are asked to write OpenGL code in Java. We have prepared a minimal 'HelloGL' at:

<https://github.com/AlexBenton/Teaching/tree/master/AdvGraph1718/OpenGL%20Demos/com/bentonian/gldemos/helloogl/HelloGL.java>

HelloGL.java uses LWJGL, available through Maven or at:

<https://www.lwjgl.org/download>

You are free to expand on HelloGL.java, or write your own Java code from scratch, or build on the framework classes supplied in the repo, as you see fit.

1. Initial geometry

- a. Render a white triangle on a blue background.
[HelloGL.java does this for you already.]
- b. Replace the triangle with a circle.
- c. Texture the circle with a red brick pattern. You may do so procedurally or with a texture image.

2. Perspective

Replace the circle with a cube, preserving your texturing, and then:

- a. Implement 3D orthographic projection.
- b. Implement 3D perspective projection.

In both cases show the cube from an angle, not face-on.

3. Lighting

- a. Implement ambient + diffuse illumination with Phong shading.
- b. Add specular illumination. Choose a camera angle which specifically demonstrates the highlighting of specular illumination on a shiny cube.

4. Final geometry

- a. Replace your cube with the Utah Teapot[1] or Stanford Bunny[2].

You should submit eight screenshots. You do not need to submit your code, but feel free to include code snippets if you have questions.

[1] Available in many file formats online, or from:

<https://github.com/AlexBenton/Teaching/blob/master/AdvGraph>

[1718/OpenGL%20Demos/teapot.off](https://github.com/AlexBenton/Teaching/blob/master/AdvGraph1718/OpenGL%20Demos/teapot.off)

[2] Available in many file formats online, or from:

<https://github.com/AlexBenton/Teaching/blob/master/AdvGraph1718/OpenGL%20Demos/bunny.off>

