CSci 4107: Programming Assignment #3

due: 8pm, Sunday, April 5

The purpose of this assignment is for you to learn how to do illumination modeling and texture mapping using OpenGL. Illumination modeling allows you to introduce lights into a scene, to specify the reflection properties of objects in the environment, and to make pictures in which the object surfaces are properly shaded. Texture mapping makes it possible for you to put a pattern, instead of a solid color, on the outside of something and to map environmental reflections onto an object's exterior. In this homework you will make a picture of a three dimensional shape, and you will use illumination modeling and texture mapping to modify the object's appearance properties.

As the starting point for your work on this programming assignment, you are to use your program for viewing superquadrics that you developed in Assignment #2. As you did in this previous assignment, you should choose *one* type of superquadric surface and create five different versions of it with n_1 and n_2 each set to one of the following values: 10.0, 2.0, 1.11, 0.77, or 0.59. You should also provide the user with the same navigation tools for changing the point of view with respect to the superquadric as were used in the previous two assignments. You may use the working version of Assignment #2 that will be posted on the course web site this Friday (March 13) to begin development of the software for this programming assignment.

In addition to the drop down menus for selecting n_1 and n_2 from the previous assignment, your web page should include another drop down menu for selecting the surface material. The surface material menu choices should be as follows:

YELLOW PLASTIC - Causes the current superquadric to assume the appearance properties of yellow plastic.

BRASS METAL - Prompts the current superquadric to take on the appearance properties of brass metal.

TEXTURE MAP - Maps an image texture onto the surface of the current superquadric.

Finally, you should allow the user to change the lighting direction by holding down the Shift key and dragging the mouse (this action should **not** change the camera position).

In order to perform the lighting calculations you will have to extend the modeling of your superquadric to include surface normals and texture coordinates. Don't forget that a triangle or quadrilateral has two sides and that, in certain circumstances, both sides can become visible (but not at the same time).

Surface textures that can be used to do this assignment can be made available to your program by inserting the following lines into your HTML file:

```
<img id="tile-img" src="http://i.imgur.com/23TQCyu.png"
                        crossorigin="anonymous" hidden="hidden" />
<img id="wood-img" src="http://i.imgur.com/F2g6RQZ.png"
                        crossorigin="anonymous" hidden="hidden" />
```

Use the **`img`** tag **`tile-img`** or **`wood-img`** along with the method **`document.getElementByID`** to access either of these two textures in your Javascript program. You are also welcome to supply your own surface texture by using a service such as **`http://imgur.com`** to make your texture accessible via a link as was done with the above two examples.

To turn in your assignment, touch the button marked submit on the course web page and follow the directions. In addition to turning in **both** the HTML and Javascript files for a web page that can be viewed using the latest version of Google Chrome, you should also submit screenshots of your program while it is displaying the superquadric using each of the four requested appearances (yellow plastic, brass metal, and texture mapped). Instructions for taking screenshots are available on the course web page.