COSC 4370 – HW2

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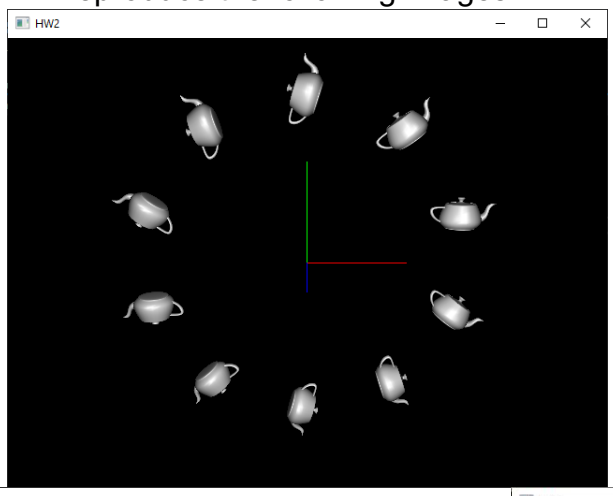
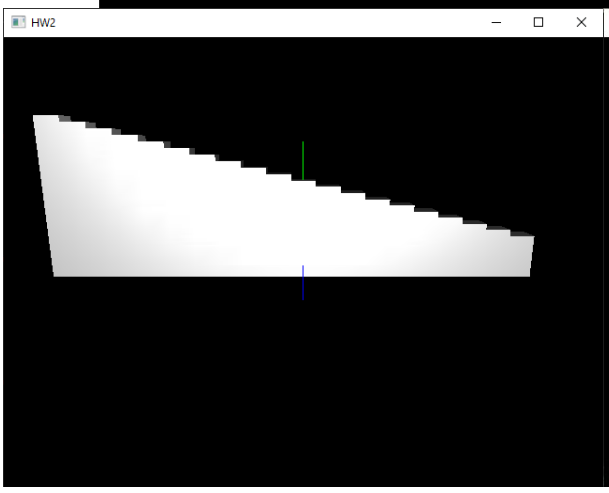
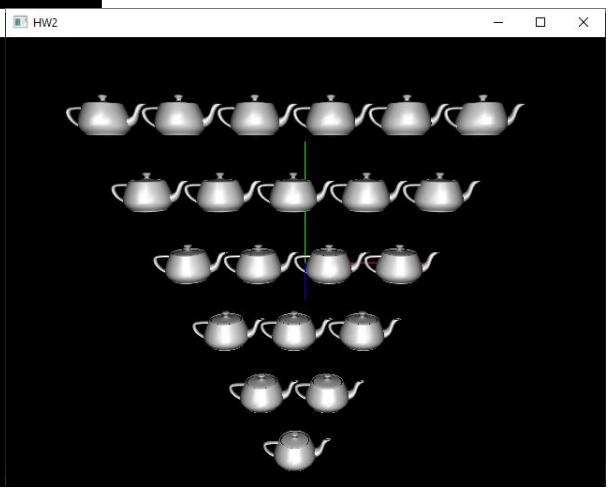
1 Problem

Practice some OpenGL concepts and….

Reproduce the following images:







In addition, we have to create a scene of our own imagination. We will be trying to replicate this:

2 Method

Some functions we will be using to replicate some of the images described in the previous section are glPushMatrix(), glTranslatef(), glRotatef(), glPopMatrix(), and glutSolidTeapot().

glPushMatrix copies the top matrix and pushes it onto the stack.

glPopMatrix pops the top matrix off the stack.

The glTranslatef function produces the translation specified by (x, y, z).

glRotatef function computes a matrix that performs a counterclockwise rotation of angle degrees about the vector from the origin.

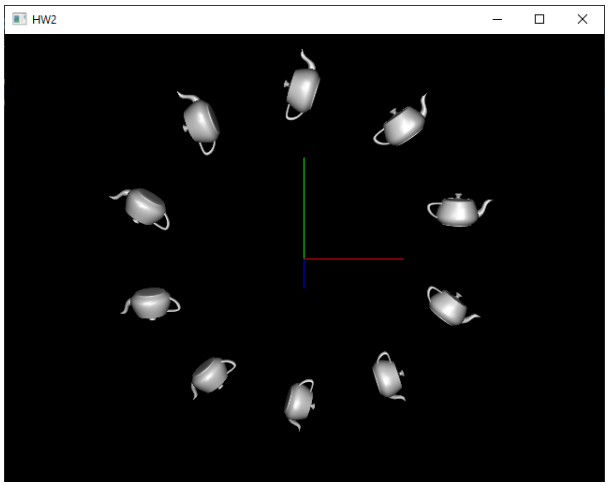
glutSolidTeapot creates a teapot.

Just by looking at some of the images, it becomes apparent that problem 1 will require some variation of glRotatef, while problem 2 or problem 3 will require glTranslatef, however this statement is just based on first glance before I have delved into any implementation. We will go into more details on how we will use all these functions to replicate these images in the implementation function.

3 Implementation

Problem 1

For problem 1, we will try to replicate this image:



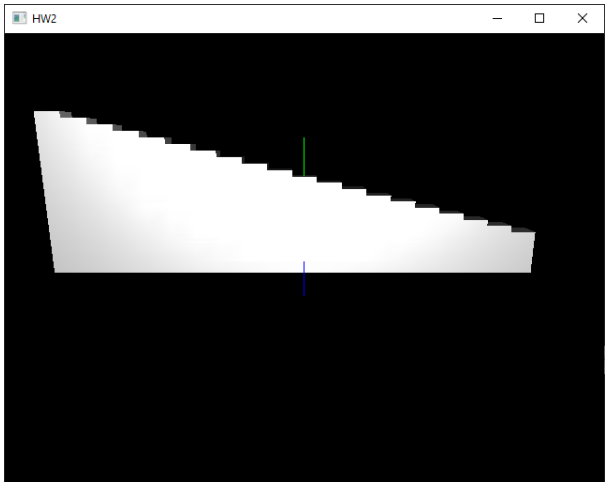
For this problem, we need to rotate to move the teapot object around the axis with a total of 10 teapots.

We first create a loop that goes from 0 to 360 and increments by 36 since we need 10 teapots (360/36 = 10).

Within each loop we glTranslatef(0, -0.5, -2) to move the object to the center, glRotatef(angle, 0, 0, 1) to rotate the object to a specified angle, glTranslatef(2, 0, 0) to translate the object 2 units along the x-axis based on the direction the teapot is rotated at, and glutSolidTeapot(.3f) to draw a teapot of size .3f.

Problem 2

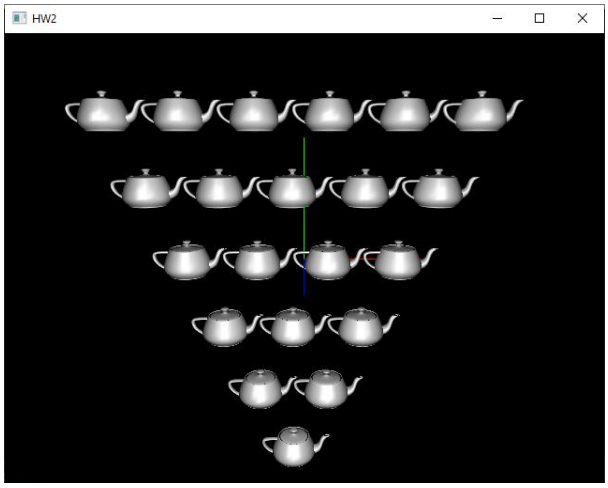
For problem 2, we will try to replicate this image:



We will create a loop that runs for 1 to 20 to create 20 stairs. We glTranslatef to move the stairs and increase the height after each loop using glScalef() and we use glutSolidCube() to draw each stair on each iteration of the loop.

Problem 3

For problem 3, we will try to replicate this image:



We can see in the image we have 6 levels and in each level there is one less tea cup.

We create a loop that iterates 6 times. For each loop we calculate the number of teapots in each level. We can calculate the number of teapots using 6 – level assuming level starts at 0 and ends at 5. For each loop we will calculate the offset and draw the teapot glutSolidTeapot(.25) and glutTranslatef() based on our offset calculations.

Problem 4

For this problem, we can recreate any object, but we will use the one provided for us in the example.

To simplify the process, we separate the object into components. We will separate it into palm, thumb (bottom/upper joint) , pointer finger (bottom/upper joint) , ring finger (bottom/upper joint), middle finger

(bottom/upper joint), and pinky finger (bottom/upper joint). Each of these components will be created using glutSolidCube and glTranslation.