COSC 4370 - Homework 2

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March. 1, 2021

1. Problem

The assignment requires the creation of three different 3D scenes through the use of OpenGL. The fourth problem allows the use of transformation functions to produce a scene of our own imagination.

2. Method

Typically, for each of the problems, I had to adjust the transformation functions to essentially create each of the problems that were required. For the first problem, circular teapots needed to be created. The second problem required the formation of a staircase, whereas the third problem needed to display pyramidical teapots. Lastly, the fourth problem was an open-ended image, that required a nested application of glPushMatrix, and the rendering of at least one triangle with direct coordinates.

3. Implementation

Problem 1

The first problem required the arrangement of 10 tea pots in a circle. The method for this problem was used by calculating the position of the first teapot by using cos(0)*radius and applying that to x, while using sin(0)*radius and applying that to y. After this, the calculation for the rest of the tea pots was through the division of 2 pi and then rotating each of the tea pots into their current position.

Problem 2

In the second problem, we were required to create a staircase. I applied this problem by creating a starting point of 15 steps. Furthermore, this was then applied from an initial point of -1.50 on the x-axis. Adding on, I introduced a for loop which allowed for the cubes to stack on top of one another. Afterwards, I created another for loop which allowed the cube to be placed slightly further than the previous one creating a staircase effect.

Problem 3

This scene requires the formation of tea pots in a pyramid. This was created through the iteration of two for loops, where the first loop was applied to the row of the even number of pots and the second loop was to create the odd number of teapots. After the creation of the tea pots, they are then put

into place through the translation transformation and then centered. Afterwards, the loop is decremented to create the next rows until the loop ends. This method allows the pyramid of tea pots to be built, similar to how it is shown in the initial picture.

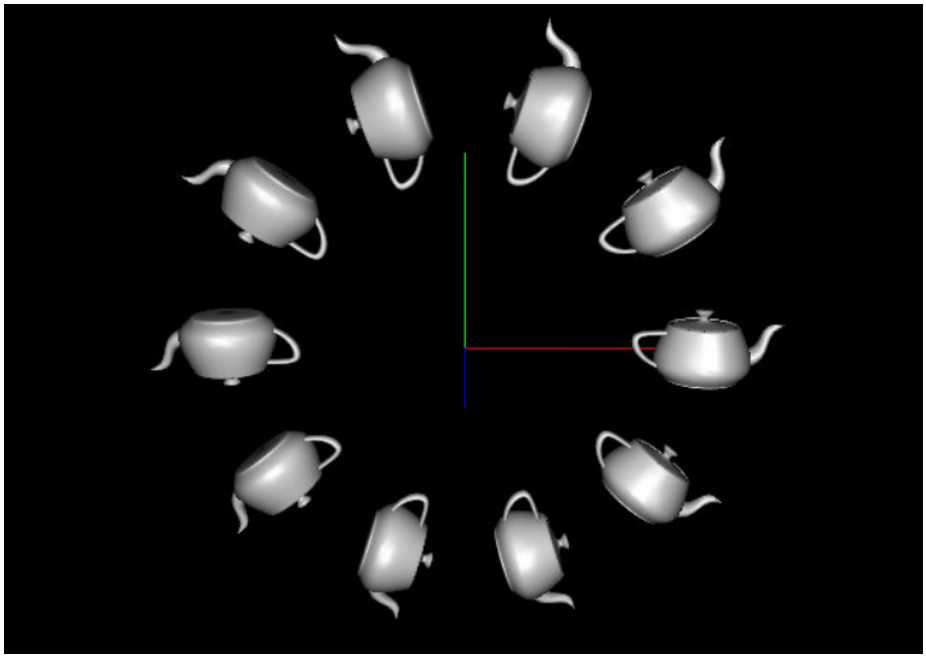
Problem 4

For this problem, we were told to create a scenario from our own imagination. I decided to start off my 3D scene, by rendering a triangle and feeding the coordinates to it directly. Then, I went ahead and rotated it. I decided that I wanted to create circular cubes and rotate them to showcase star cubes. I set the size to 0.15 which allowed for the cubes to be slightly smaller. I then was able to create star cubes in a circle by implementing a for loop and increased the degree from 2pi to 5pi. Adding on, I was able to display the first circular cubes, and then the next block of code created the second circular cubes. I adjusted the rotation of the cubes to create a star cube effect.

4. Results

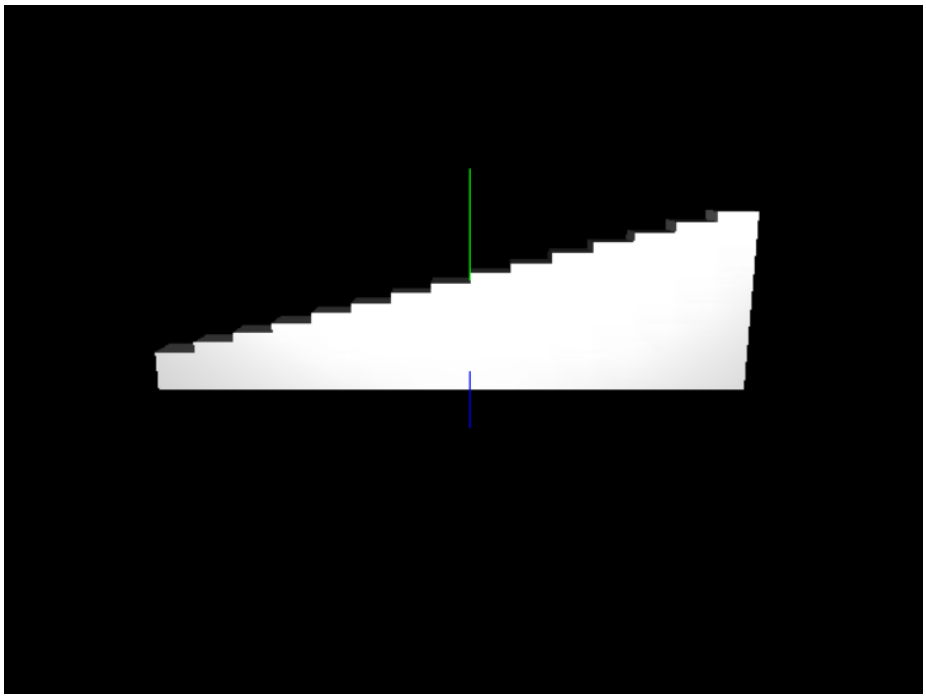
Problem 1

Problem 1 resulted in the 3D creation of circular teapots. We can clearly see that the teapots are rotated and spaced out evenly.



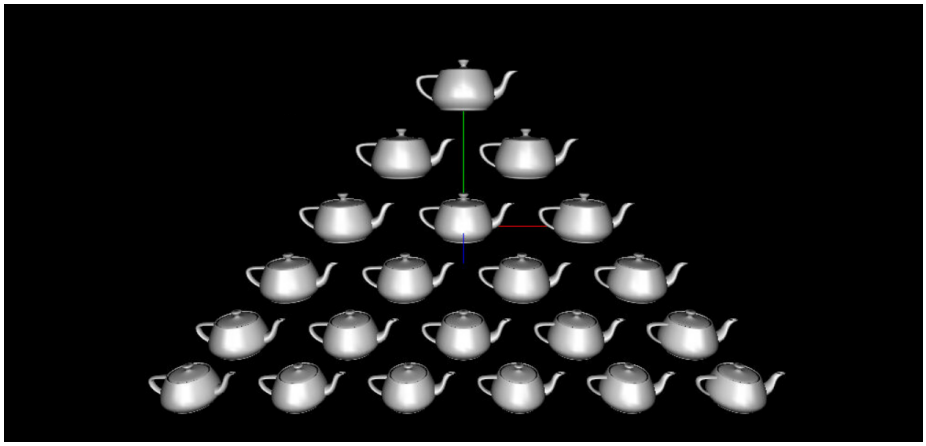
Problem 2

The image of problem 2 created a staircase, similar to the image that was given in the instructions.



Problem 3

As for problem 3, there is a clear depiction of teapots that are stacked in a pyramid.



Problem 4

Last but not least, problem 4 ended up displaying circular star cubes with a triangle located inside.