CSC418 A3/A4 Report

Planning:
We had planned to have pieces of the project done in a 1-3 day milestone setup. Initially our first goal was to just get the plane to show up, then the spheres, then start on shading, etc. Our first day with the project was understanding how to work with our psuedo-objects like the object3D, ray3D, point3D and how to manipulate them using the code in utils.c and Raytracer.c. Once we understood what we had to work with we simply implemented the TODO functions in utils.c and then began working in the ray tracing loop to try and intersect with the plane. Our predicted time to get the plane showing up as intended was 1-3 days but it ended up taking us a little over a week (in addition to other course work) due to issues with starter code and incorrect values from our normals and matrix multiplication. We then each took up a small task that would move us forward, such as: sphereIntersect, light rays, shadow rays, anti aliasing, etc. Once we had spheres and planes intersected properly, implementing the rest of the features for A3 and the few for A4 were a lot easier, and allowed us to simple work with the lecture and tutorial notes.

Code challenges:
There were a few areas where we were unable to get everything working 100%. In cylinderIntesect, we were unable to intersect with the top and bottom planes of the cyliner, therefore the cylinders are opened on the bottom and top. We also used a gaussian filter, which allowed us to have 3 dimensional function that could allow us to weigh our colors found during our super sampling accordingly (higher weight for rays shot through the center). There was also some arithmetic done in PlaneIntersect to allow our texture mapped image to scale properly on the plane. We also started to work on the glossy effect but did not get enough time to test it out and finish it (it is commented out in Raytracer.c).

Difficulty:
The hardest part about this assignment was getting started. It took a long time for us to get the initial image to show up correctly. It took a lot of debugging and trial and error till we got the image. The next difficult challenge we had was with lighting. We had a lot of issues with our normals not being assigned or returning as an unexpected value due to improper handling of pointers and memory addresses.

What we found easier was actually implementing the extra stuff. So calculating the phong model and doing anti-aliasing was fairly simple, since we had all the variables and tools already setup. These were a lot easier to implement and therefore the challenge was less about debugging and more about testing and tweaking.

Learning:
We learned a lot about the power working from world to local matrices. Once we sat down and understood the math at each step we realized a lot about how impactful our use of linear algebra could be. We each worked on separate pieces, but discussed with each other throughout the process to make sure we understood in case something went wrong or we needed to adjust it.

Implemented(A4)
- AntiAliasing SuperSampling with Gaussian Filter
- Plane texture mapping
- Open ended finite cylinder

- coded but did not use glossy effect
- Area light sources