For my 3D scene I choose a snack box, a lollipop, a can, and a pumpkin cat toy. These objects were chosen because they met the requirements of the assignment using complex shapes and different types of shapes. To create the box and its top was very straightforward. The vertices for the box and its top were very easy to hard code into the project without issue. Figuring out sizing and placement were also quite easy, just playing with the numbers I was able to create a scene and objects that lined up correctly. I knew the box would be the easiest thing to create. The second object I focused on was my can. Since that was a cylinder, I knew I would be able to reuse the code I created that made the vertices of the cylinder for at least the stick of the lollipop. This took a lot longer than I expected. I got very lost getting the texture coordinates setup correctly because I had an idea in my head that did not actually apply to the program, and it took breaking down how the cylinder was built to understand exactly what was going on. Once I did that it was less than an hour to make the coordinates work correctly. The pumpkin cat toy and the actual candy of the lollipop were supposed to be spherical but I had issues getting spheres to render with my shaders and existing render code. I spent way to long attempting to get it to work, that I had to give up on that and replaced both things with something that made sense. A cube for the pumpkin was the best choice as a replacement because that could just be a kids toy. A cylinder, using my working cylinder building code, was the best choice as a replacement for the candy of the lollipop since that was circular and might be a shape possible for some weird lollipop out there.

To navigate the 3D scene, the user will use the mouse to look around then the WASD keys to move forward, left, back or right. The user can also use the q key to move up and the r key to move down. All these movement allow for easy flying to look at all the objects from different angles. The scroll wheel can be used to speed up or slow down the movement speed to get to different areas faster. The user can also use the p key to change the perspective of the scene between orthographic and perspective views. This creates different looking views and just looks cool. Creating the controls to move around was very easy. Using functions that are build into the OpenGL libraries, I was able to create a very easy to use camera class which controlled the movement and viewpoints, as well as the matrices involved in rendering the scene.

I used a lot of custom functions to organize my code into modular and reusable parts. This was done to keep myself organized when looking at this giant project, as well as creating parts that I could use more than once so I was not repeating code all the time. One of the most used modular parts of my project is the MyMeshes struct. This is used to hold all vertices, texture coordinates, normal vectors, and VBOs of each object in my scene. By using a custom struct I was able to add objects by entering vertices, texture coordinates, then “uploading” the object to create the normals, and VBOs for each object. This also made rendering each object a simple method call to my draw method in the struct, sending the model with a translation, the shader and the texture that each object was using. This would have made a larger mess of my render method. Another custom modular aspect was my cylinder struct. This was just used to create the vertices, texture coordinates, and normals for each cylinder. These parts were then moved into my MyMeshes struct and drawn in the same way of the cubes and simple objects were created. I also had a few utility methods that made my main method look cleaner. Methods that uploaded all my objects, loaded textures, and created vertices were all called in the main method as parts of a modular setup. This made it easy to add more objects because I could find the methods needed for each step of adding a new object, as opposed to digging through a large main method and adding everything in a disorganized way.