**Jess Dowd**

**Professor Malcolm Wabara**

**CS 330**

**15 April 2025**

**7-1 Final Project Submission**

**Justify development choices for your 3D scene. Think about why you chose your selected objects. Also consider how you were able to program for the required functionality.**

For this scene I used my own photo that showed a pool ball, a makeup compact, a colored pencil, and a lip tint tube on a piece of white paper. I chose those because they were simple real-life objects that could be modeled using basic shapes. The pool ball is a perfect match for a sphere, the compact works well as a box, the lip tint a cylinder, and the pencil was built using a cylinder for the body and a cone for the tip. That also helped me meet the requirement of using multiple shapes for one object. These items have clear silhouettes and don’t need any complex modeling to look recognizable. I was able to focus more on the lighting, placement, and interaction parts of the assignment.

I programmed the functionality step-by-step across the milestones. I got textures working on pencil first using a wood texture for the tip and end and I found a blue lined texture for the cylinder part. I had an issue that the red texture for the pool ball wouldn’t load so I just colored it red instead and gave it a shiny material so it will catch the light. I found a black texture that closely matched the look of the compact and applied that. I added three light sources. One white desk-style light from the upper left, a warm yellow light from the right like a ceiling lamp, and a soft top-down light to stop shadows from being too harsh. I used the full Phong lighting setup with ambient, diffuse, and specular for all of them. I placed the lights so all the objects stayed visible when the camera moves. I placed the objects in 3D space using the same layout from the photo and I adjusted in X, Y, and Z space manually until everything matched up to the photo.

**Explain how a user can navigate your 3D scene. Explain how you set up to control the virtual camera for your 3D scene using different input devices.**

I set up full 3D navigation for the camera using both keyboard and mouse input. The W, A, S, D keys move the camera forward, backward, and side-to-side. The Q and E keys move the camera up and down. For looking around I used the mouse cursor to control the camera so the user can look up, down, left, and right. The mouse scroll wheel changes the speed of camera movement which makes it easier to move slowly or quickly through the scene depending on what the user wants.

I also included the O and P keys to toggle between perspective and orthographic views without changing the camera’s location. That way the user can see the difference between depth view and flat view for better visualization.

**Explain the custom functions in your program that you are using to make your code more modular and organized. Ask yourself, what does the function you developed do and how is it reusable?**

I used SetTransformations() before each shape to handle scale, rotation, and position in one place. That kept me from having to rewrite that same logic over and over.

I also used SetShaderTexture() or SetShaderColor() depending on if I was using a texture or solid color. SetShaderMaterial() applied lighting properties so objects could reflect light properly. For loading all my textures at the start I used CreateGLTexture() and BindGLTextures() inside LoadSceneTextures().

I handled lighting in its own function called SetupSceneLights() where I placed and configured the three lights. I also defined materials in DefineObjectMaterials() with different shininess and light behavior depending on the object.