Programming Assignment 3

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For this assignment, I implemented a program to render wavefront `.obj` files with phong lighting. I only included the Phong shading code, though I had also tested with Gouraud shading. Though there were differences between the two outputs, the differences were minor.

Usage

```
# obj: Free_rock.obj or Chair.obj
# x, y, z: the camera location, looking at 0, 0, 0
# mode:
#   0: wireframe
#   1: untextured
#   2: textured
#   3: normal mapping
# for debugging, press Space, '.', ',' to rotate
$ ./main.py [obj] [x y z] [mode]

# for example:
$ ./main.py Free_rock.obj -10 10 10 0
$ ./main.py Chair.obj -1 2 1 3
```

References

I used the free "Sofa Chair" asset from turbosquid:

https://www.turbosquid.com/3d-models/3d-model-sofa-chair-2194116
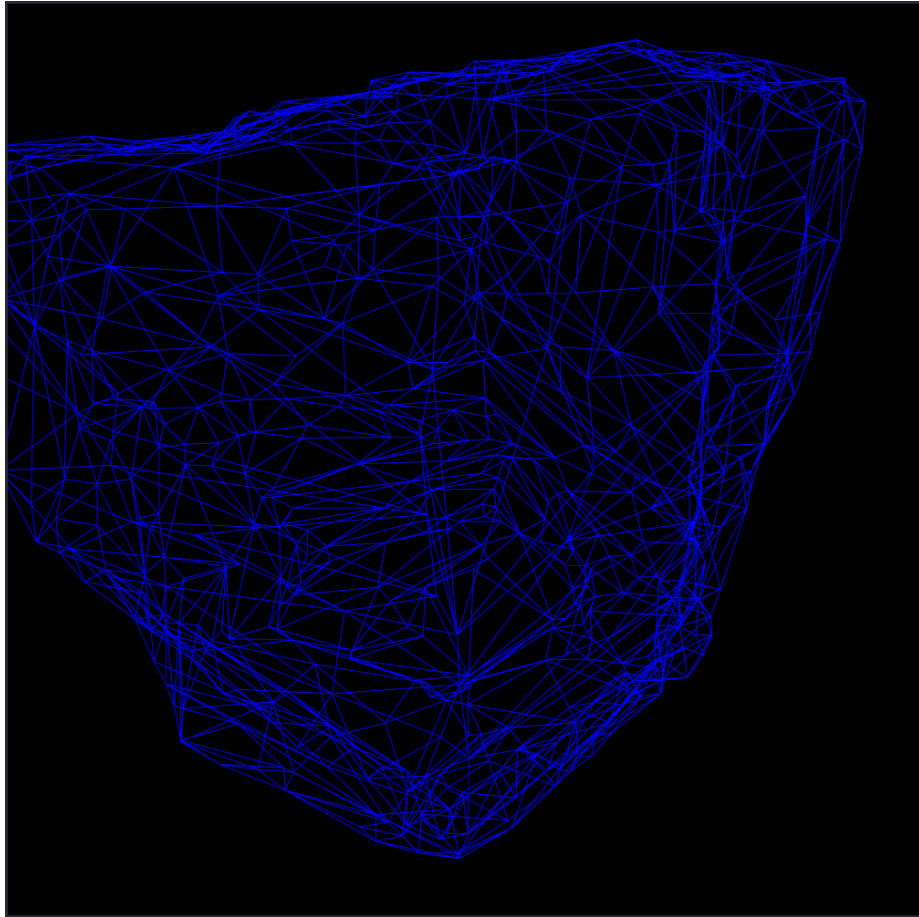
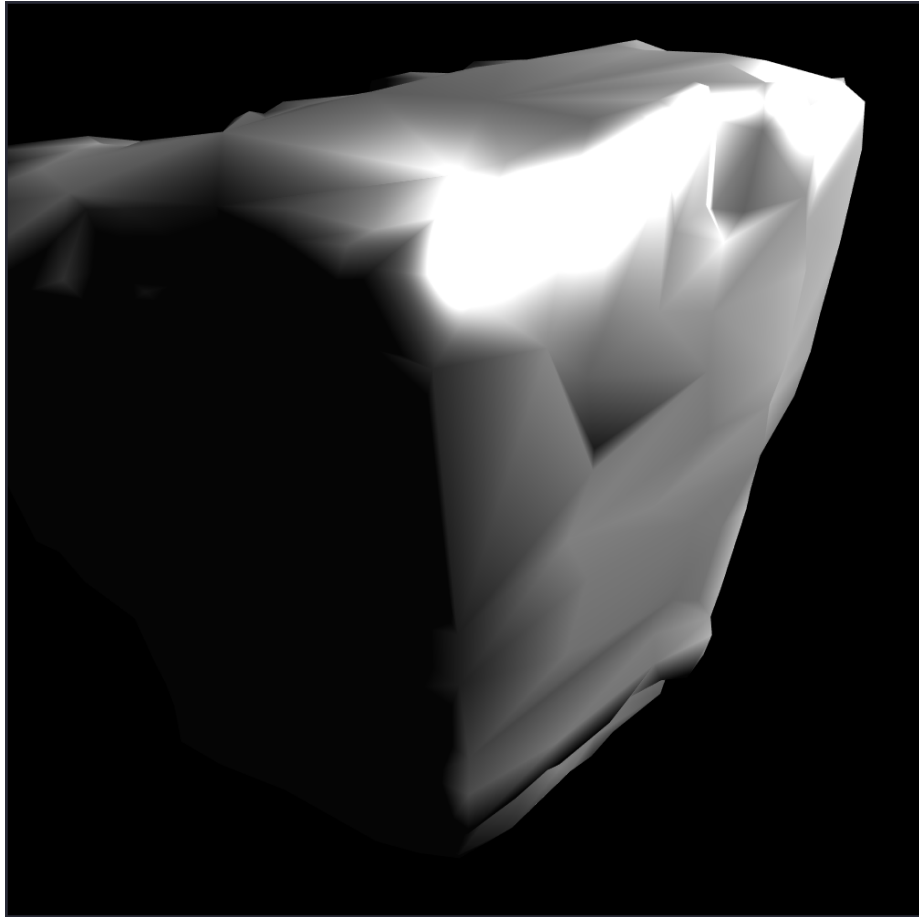Figure 1: Free_rock, wireframe

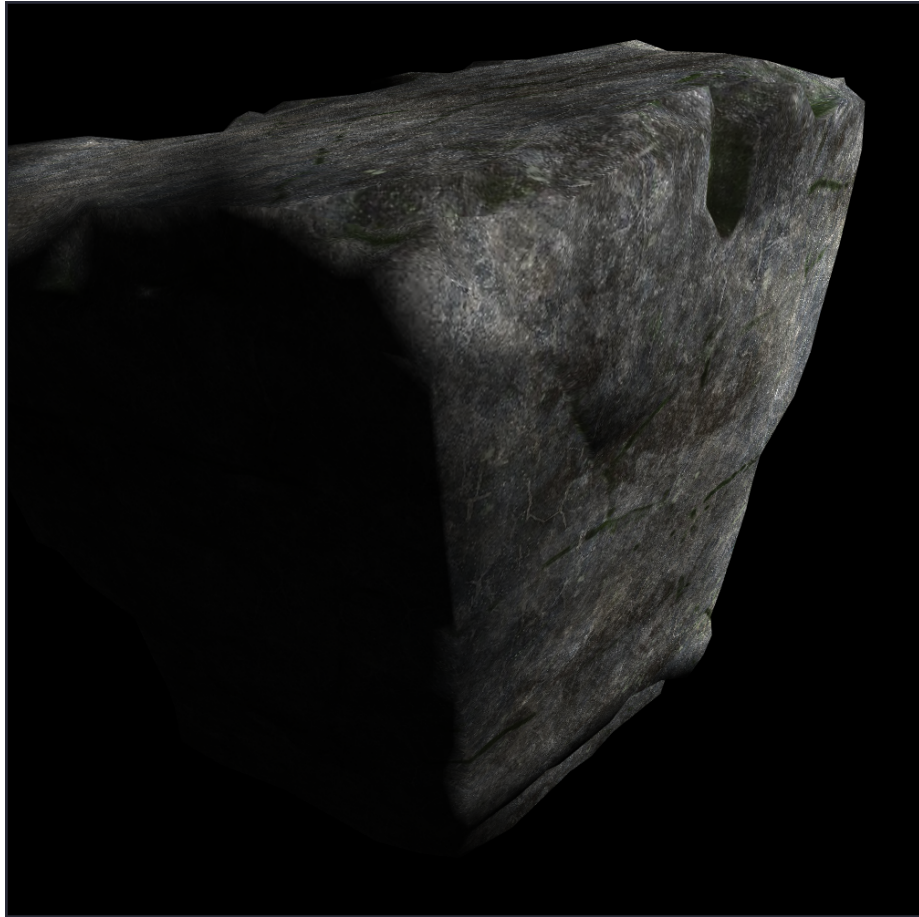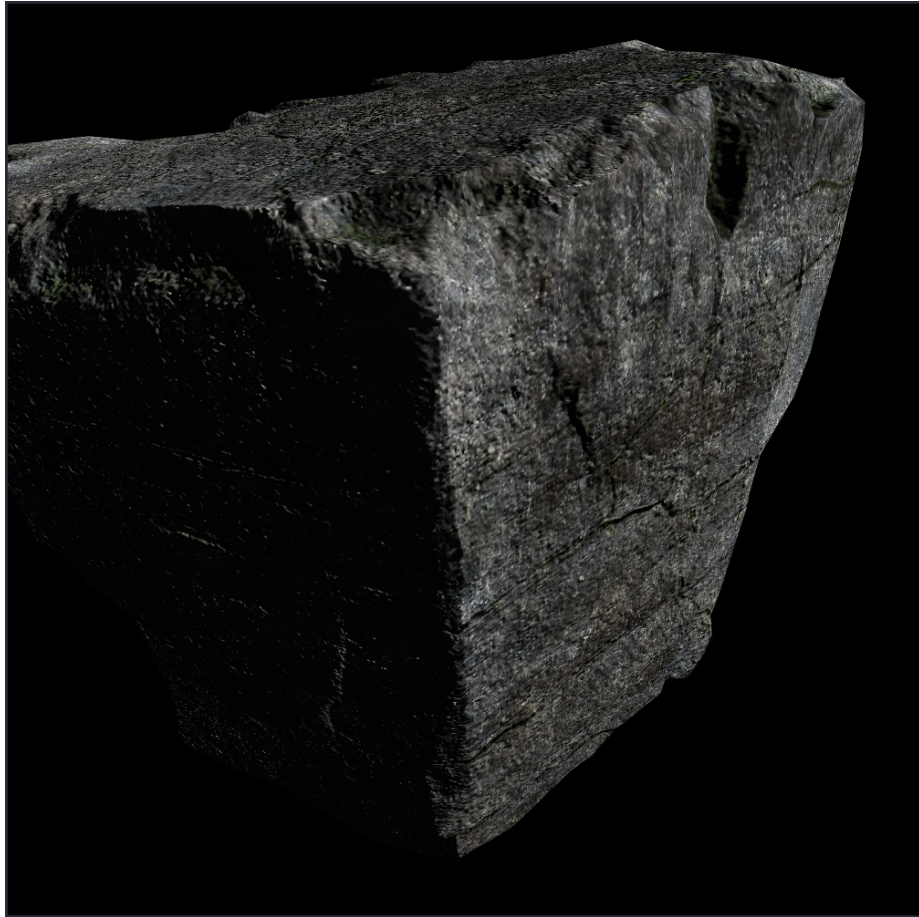Figure 2: Free_rock, untextured

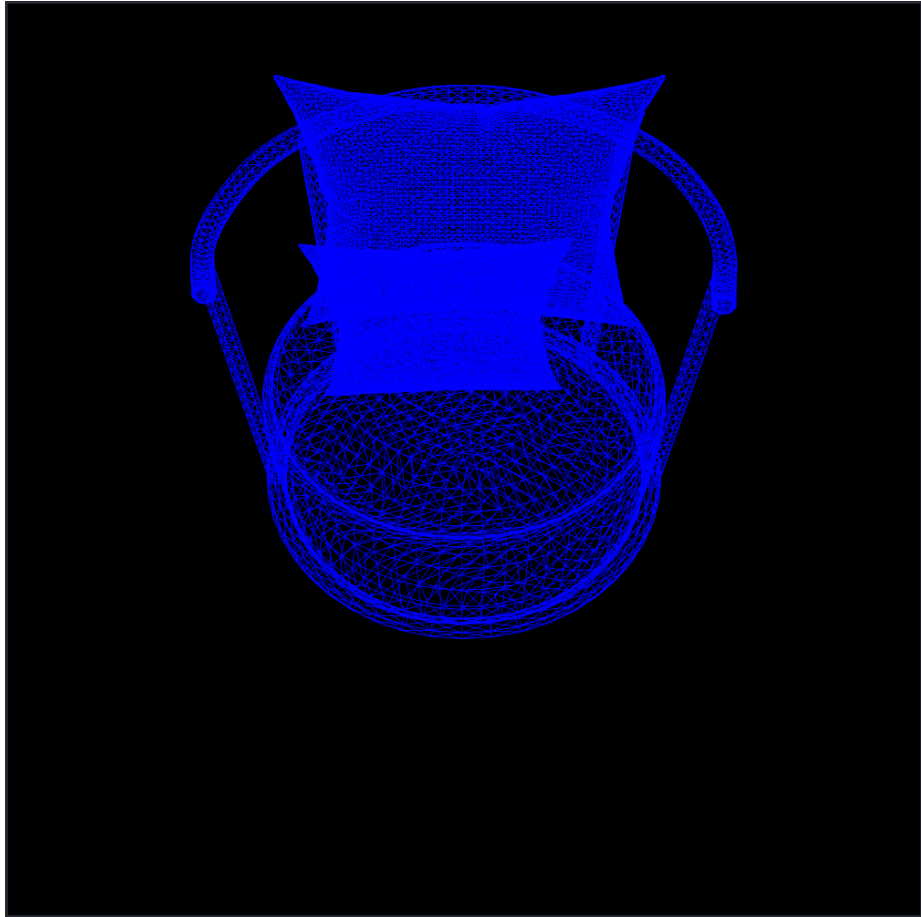Figure 3: Free_rock, textured

Figure 4: Free_rock, normal mapped
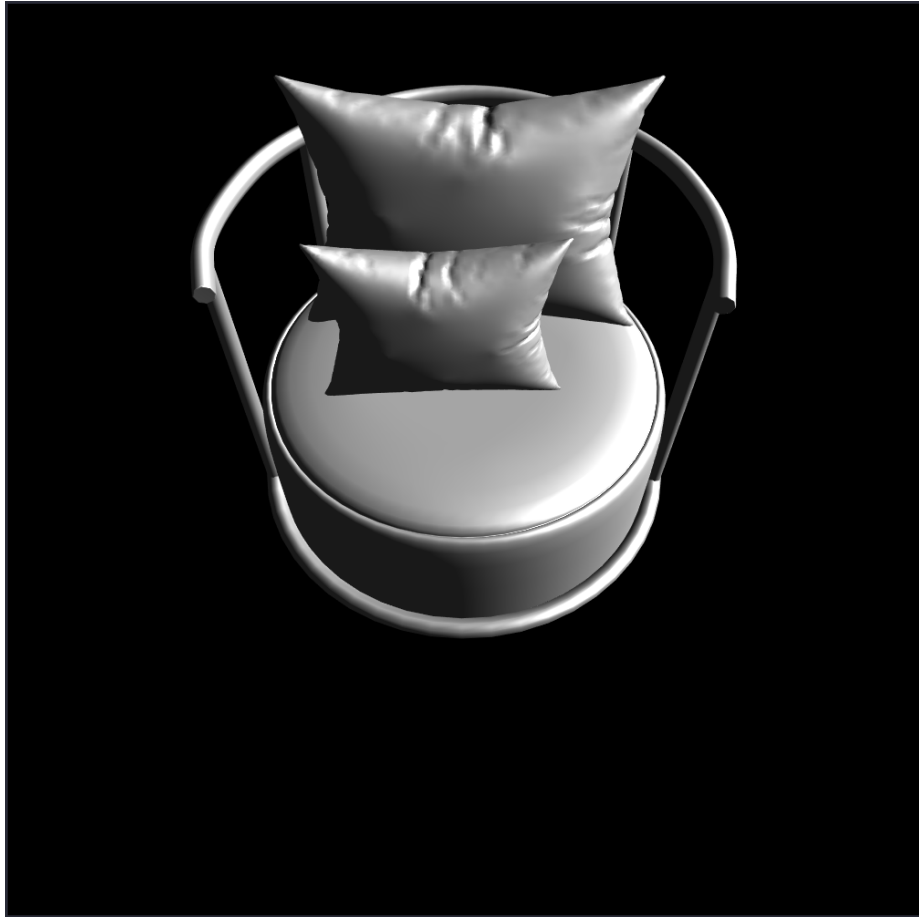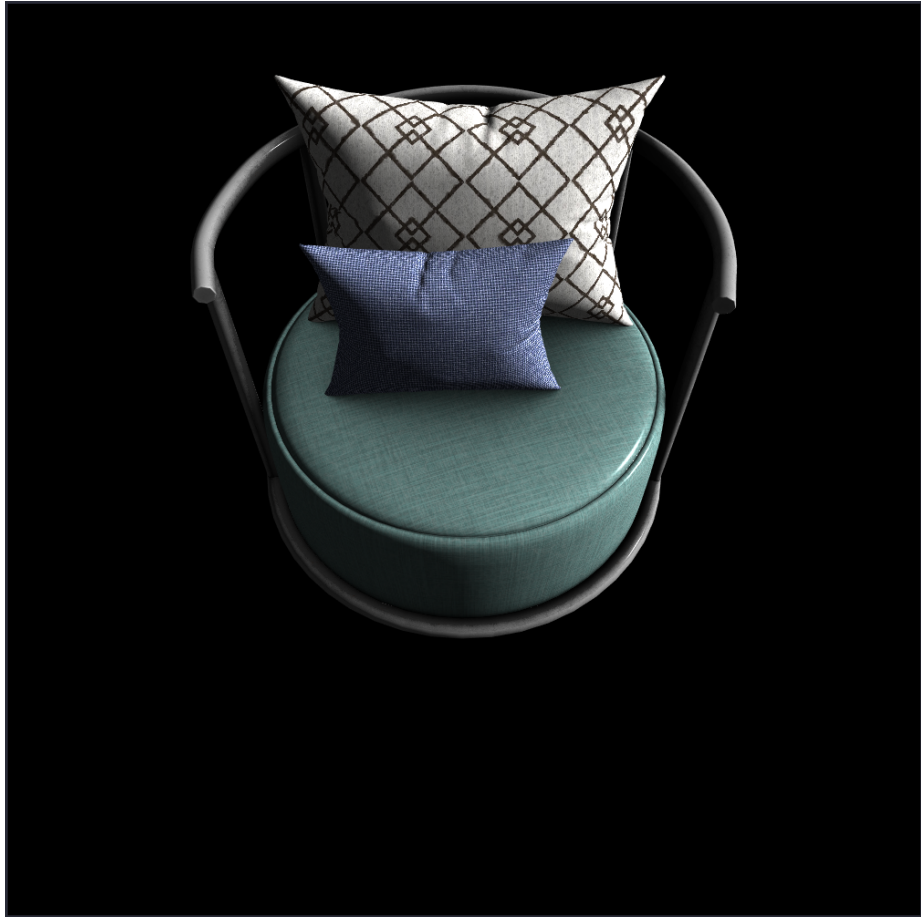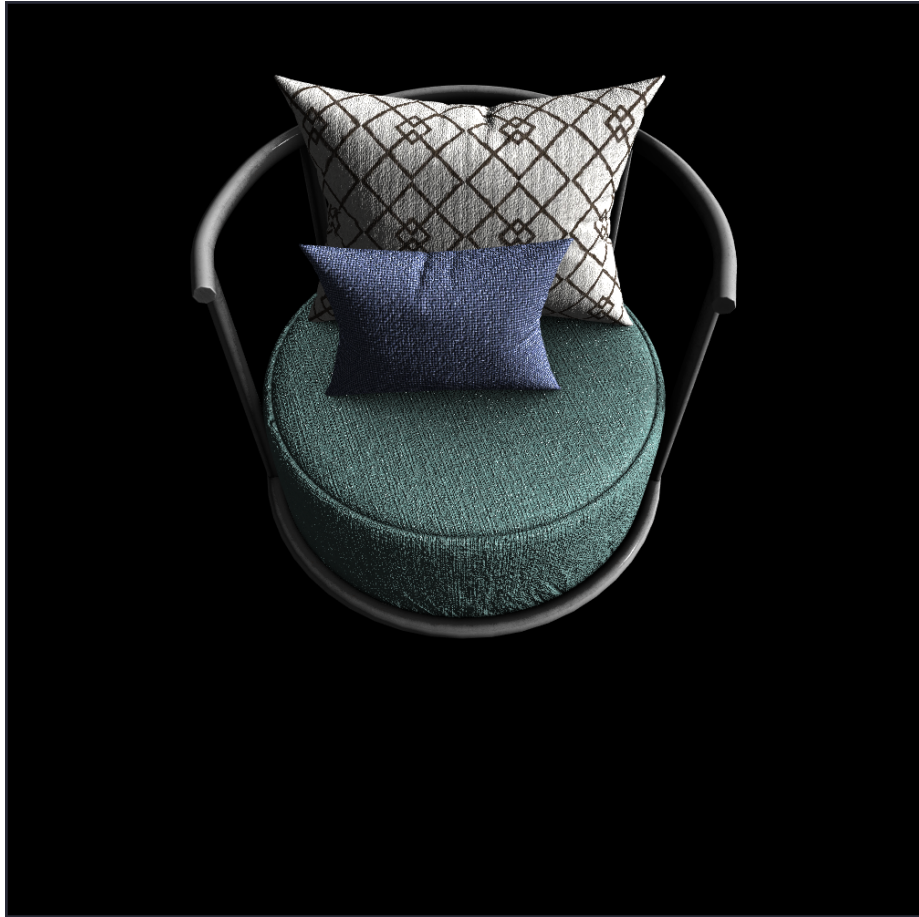
Figure 5: Chair, wireframe

Figure 6: Chair, untextured

Figure 7: Chair, textured

Figure 8: Chair, normal mapped