
POV-Ray Group Project

1 Exercise 1

Try setting your own scene with camera, light source(s), and back-ground. And put (an) object(s) in the scene! Adjust your settings till you are satisfied with the scene! For now, if you don't add in any object modifiers, your object would just look like a solid black block. But that's okay! In what follows, we will introduce some object modifiers, which will add surface properties and textures to your object(s). See Figure 1.

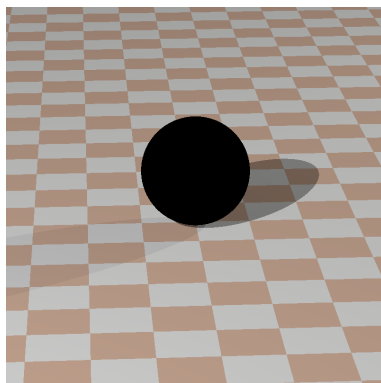


Figure 1: Solution for Exercise 1

2 Exercise 2

Try adding object modifiers to the objects in your scene. Try adjusting the settings till it meets your artistic standards! See Figure 2.

3 Exercise 3

Construct and visualize the interesting shape that is the intersection of the three cylinders $x^2 + y^2 < 1$, $x^2 + z^2 < 1$, $y^2 + z^2 < 1$. See Figure 3.

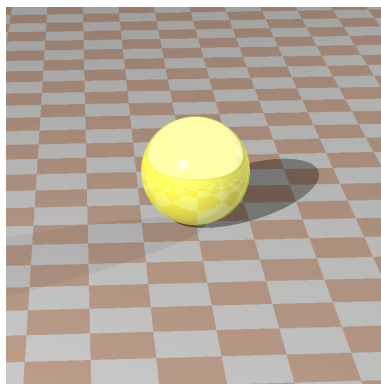


Figure 2: Solution for Exercise 2

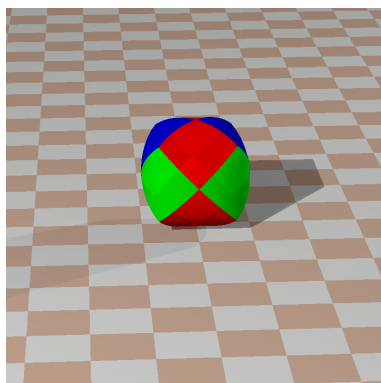


Figure 3: Solution for Exercise 3

4 Exercise 4

Our favorite donut shape (torus) has polynomial representation:

$$x^4 + 2x^2y^2 + 2x^2z^2 - 2(r_1^2 + r_2^2)x^2 + y^4 + 2y^2z^2 + 2(r_1^2 - r_2^2)y^2 + z^4 - 2(r_1^2 + r_2^2)z^2 + (r_1^2 - r_2^2)^2 = 0$$

Could you make a donut shape using poly, or one of the shortcuts? What degree of polynomial should we use See Figure 4.

5 Exercise 5

Recall the superellipsoid movie Chris shown in class... We can define a superellipsoid shape with the 4-vector-norm. For example, $(x^4 + y^4 + z^4)^{\frac{1}{4}} = R$ As a practice for the syntax, could you construct three superellipsoid using the above three methods respectively: (a) using "isosurface"; (b) using "poly" or its shortcuts; (c) using "superellipsoid" keyword, what values of r , n should you choose? Lastly, consider assigning them different colors and textures! :) See Figure 5.

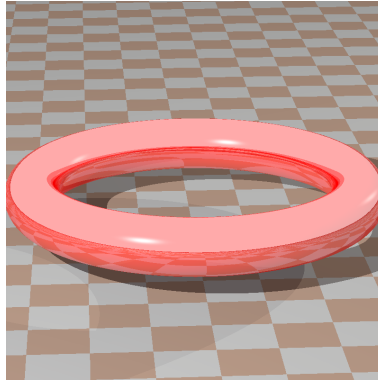


Figure 4: Solution for Exercise 4

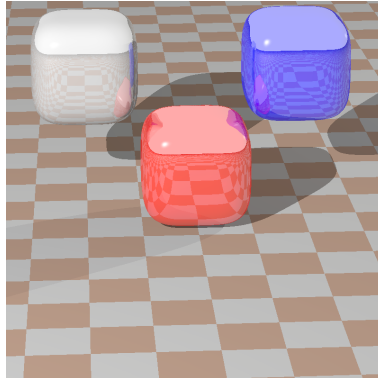


Figure 5: Solution for Exercise 5

6 Exercise 6

Creativity time! Create whatever scene you like! The only requirement is that it contains an object defined by mathematical expressions. What mathematical shapes you find beautiful? Try adjusting the lights, surface properties, etc, till it meets your artistic standards! Alternatively, you can create your object(s) based on some program outputs! See Figure 6.

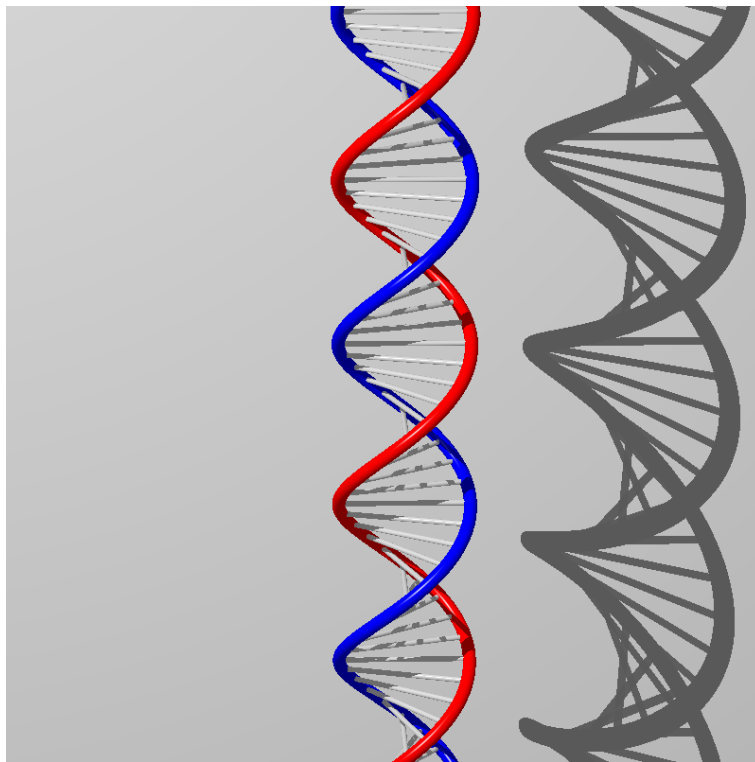


Figure 6: Solution for Exercise 6