CZ2003: Lab 4

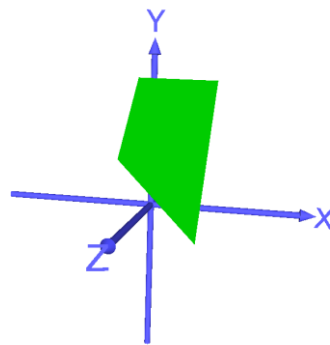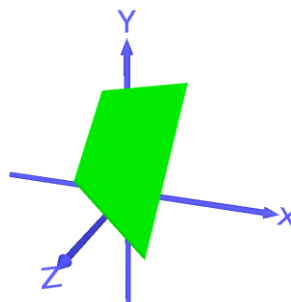| **Name:** Neo Rui Xuan Berlynn	**Last two digits of the matric card:** 12

Q1a	
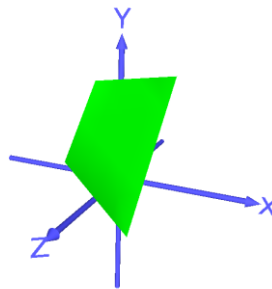
$$2x + 2y + 2z - 6 = 0$$
bboxCenter = [0.5 1 1]
bboxSize = [1 2 2]
Resolution = [5 5 5]

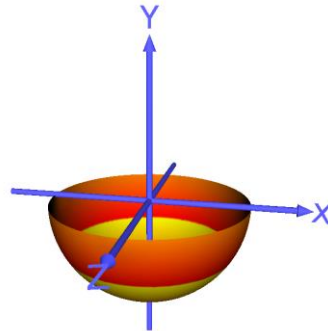*Name of the file: Lab4_Qn1_a.wrl*

Name of the file: Lab4_Qn1_a_SmallR.wrl
The sampling resolution is lower at [2 2 2]. As the resolution is lowered, the surface looks the same but darker. The surface does not appear when resolution is lowered further to [1 1 1].
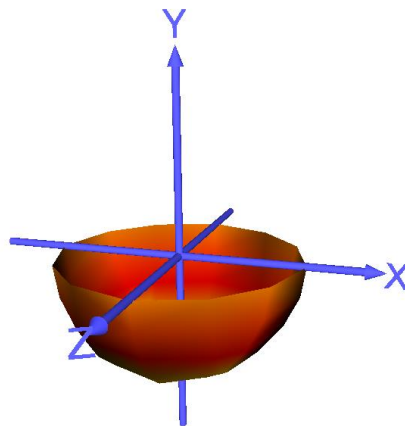

Name of the file: Lab4_Qn1_a_BigR.wrl
The sampling resolution is higher at [50 50 50]. As the resolution is increased, the surface looks the same but becomes brighter with some gradient, until eventually the gradient is not visible anymore.
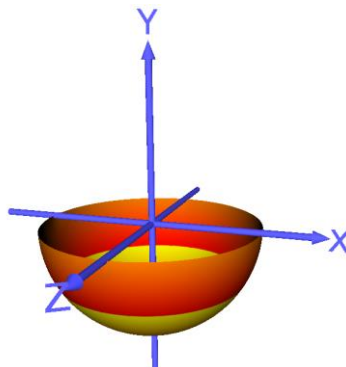
Q1b	
	$x^2 + y^2 + z^2 - 2^2 = 0$
	bboxCenter = [0 -1 0]
	bboxSize = [4 2 4]
	Resolution = [50 50 50]

Name of the file: Lab4_Qn1_b.wrl
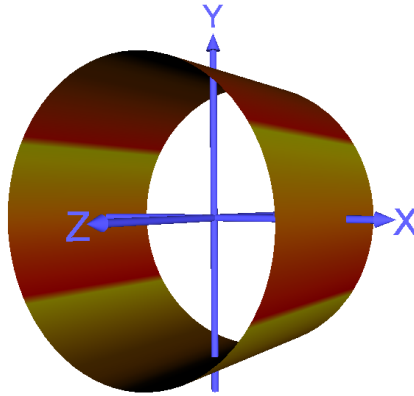

Name of the file: Lab4_Qn1_b_SmallR.wrl
The sampling resolution is lower at [5 5 5]. From the top view, the object appears more polygonal as less surfaces are used to form this object. As the resolution is lowered further, the object appears more "boxy" and less smooth, until it becomes a square from the top view at resolution [3 3 3].

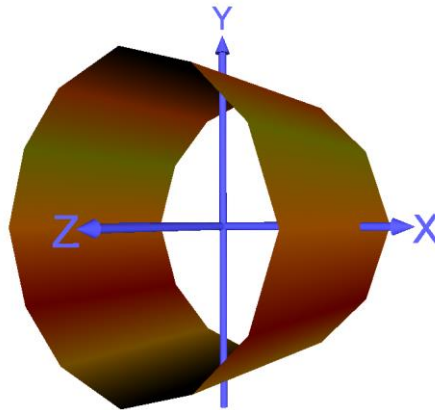Name of the file: Lab4_Qn1_b_BigR.wrl
The sampling resolution is higher at [100 100 100]. The surface of the object is evidently smoother as the resolution increases as more surfaces are used to form this object. This also causes the shadow inside the hemisphere to appear more darker as the object becomes more curved with more surfaces used.
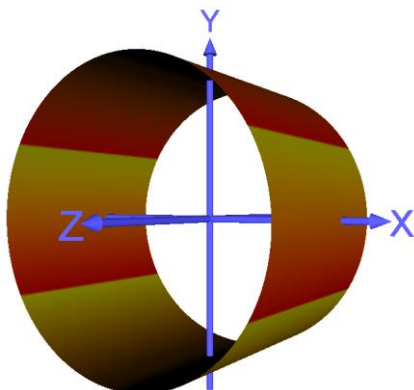
Q1c

$$x^2 + y^2 - 2^2 = 0$$
bboxCenter = [0 0 0.5]
bboxSize = [4 4 3]
Resolution = [25 25 25]

Name of the file: Lab4_Qn1_c.wrl
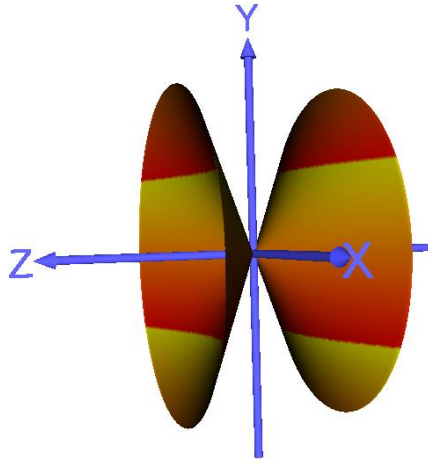

Name of the file: Lab4_Qn1_c_SmallR.wrl
The sampling resolution is lower at [5 5 5]. Similar to the previous question, the object appears more polygonal when viewing the xy-plane. As the resolution decreases, the xy-plane view of the object will be less smooth and more "boxy" because less surfaces are used to form this object. The inner surface of the hollow cylinder also has visible lines that show the surfaces that form this object.

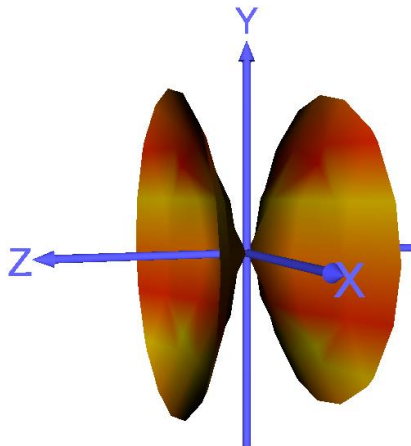
Name of the file: Lab4_Qn1_c_BigR.wrl
The sampling resolution is higher at [100 100 100]. As the resolution increases, the object appears smoother and more like a circle when viewing the xy-plane. Additionally, the inner surface of the hollow cylinder appears smoother as well. This is because more surfaces are used to form this object. This also causes the shadow on the inner side of the cylinder to appear more darker as the object becomes more curved with more surfaces used.
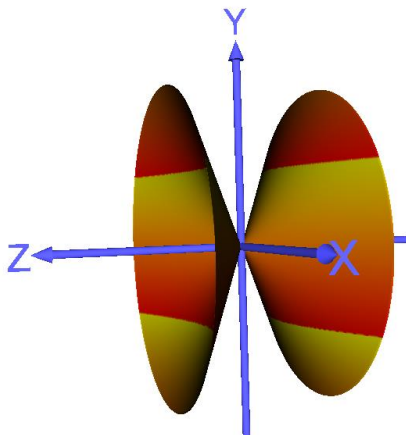
Q1d	

$$x^2 + y^2 - 2^2 * z^2 = 0$$
bboxCenter = [0 0 0]
bboxSize = [4 4 2]
Resolution = [100 100 100]

Name of the file: Lab4_Qn1_d.wrl

*Name of the file: Lab4_Qn1_d_SmallR.wrl*
The sampling resolution is lower at [7 7 7]. Similar to the previous two questions, the originally circular parts of the object now appear more polygonal as less surfaces are used to form this object.

Name of the file: Lab4_Qn1_d_BigR.wrl
The sampling resolution is higher at [150 150 150]. As the resolution increases, the circular parts of the object appear smoother as more surfaces are used to form this object.
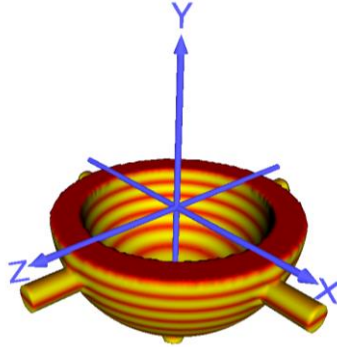
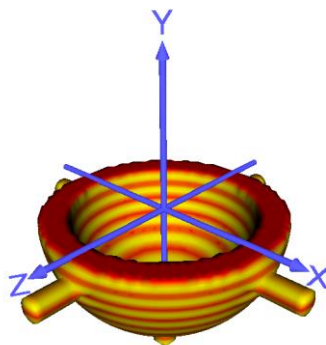| Q2	
	$function\ frep(x,y,z,t)\{$ $sphere1 = 2^2 - x^2 - y^2 - z^2;$ $cylinder1i = \min(0.2^2 - x^2 - (y + 0.5)^2, -(z - 2.7));$ $cylinder1 = \min(cylinder1i, z + 2.7);$ $cylinder2i = \min(0.2^2 - (y + 0.5)^2 - z^2, -(x - 2.7));$ $cylinder2 = \min(cylinder2i, x + 2.7);$ $cylinder3 = \min(0.2^2 - x^2 - z^2, y + 2.7);$ $shape1 = \max(sphere1, cylinder1);$ $shape2 = \max(cylinder2, cylinder3);$ $shape3 = \max(shape1, shape2);$ $planeHalfSpace = y;$ $shape4 = \min(shape3, -planeHalfSpace);$ $sphere2 = 1.5^2 - x^2 - y^2 - z^2;$ $final = \min(shape4, -sphere2);$ $return\ final;\}$ bboxCenter = [0 -1 0] bboxSize = [5.5 3.4 5.5] Resolution = [100 100 100]
	Name of the file: Lab4_Qn2.wrl
	  Name of the file: Lab4_Qn2_SmallR.wrl *The sampling resolution is lower at [60 60 60]. The top of the hemisphere is evidently less smooth and more jagged, and the cylinders appear more "boxy" as the resolution is lower.*
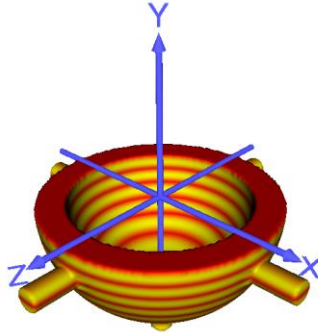
Name of the file: Lab4_Qn2_BigR.wrl

The sampling resolution is higher at [125 125 125]. The cylinders and the top of the hemisphere are smoother and less jagged as the resolution is higher. As the resolution is increased, the time taken to visualize the object is longer and at this resolution, the object is visualized in the required time (5 seconds).
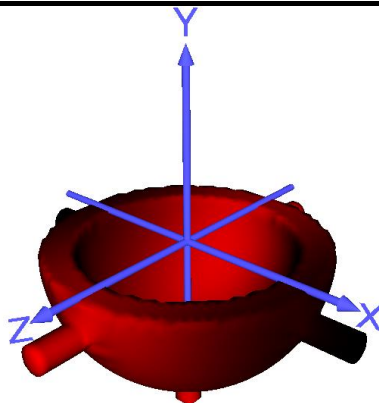
Q3
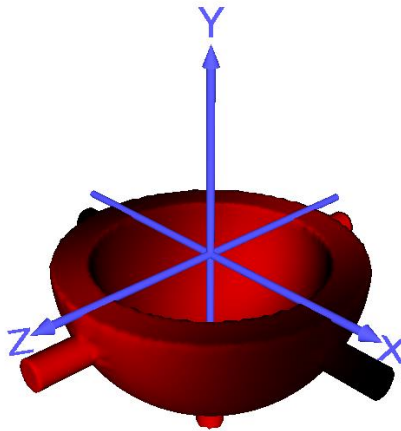
$$r = \frac{cos\left(\frac{\pi u}{2.7}\right)}{2} + 0.5; \ g = 0; \ b = 0;$$

bboxCenter = [0 -1 0]
bboxSize = [5.5 3.4 5.5]
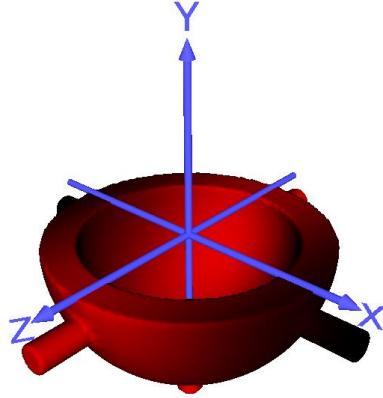*Resolution = [100 100 100]*

Name of the file: Lab4_Qn3.wrl

Name of the file: Lab4_Qn3_SmallR.wrl

The sampling resolution is lower at [60 60 60]. Same as the previous question, the top of the hemisphere is evidently less smooth and more jagged, and the cylinders appear more "boxy" as the resolution is lower.

Name of the file: Lab4_Qn3_BigR.wrl
The sampling resolution is higher at [125 125 125]. Same as the previous question, the cylinders and the top of the hemisphere are smoother and less jagged as the resolution is higher. As the resolution is increased, the time taken to visualize the object is longer and at this resolution, the object is visualized in the required time (5 seconds).