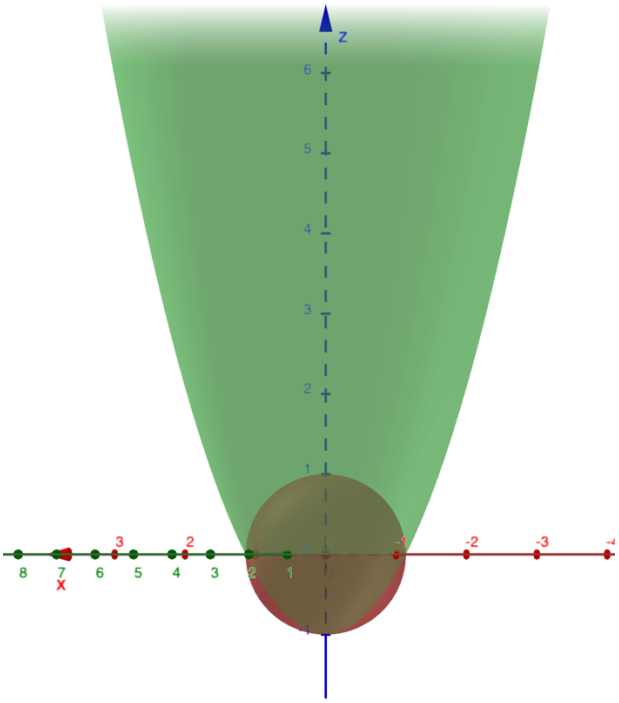
Yap Example Screen Shots

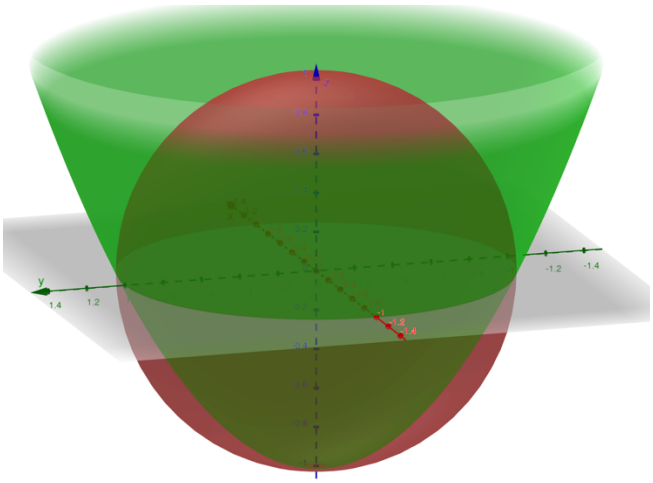
These are example screenshots that encompass all of the prebuilt conic sections I have in my code. The GeoGebra pictures are screenshot from https://www.geogebra.org/3d and use the same equations which I placed in my code. Note to showcase the GeoGebra images in a more visually appealing manner, I sometimes have provided zoomed out screenshots beyond the box dimensions that my code evaluates the intersections in (from -1 to 1 in the x,y,z intervals). Specifically, my code only evaluates the intersections of these surfaces in the box region = [-1,1] x [-1,1] x [-1,1].

1. Sphere and Elliptic paraboloid:

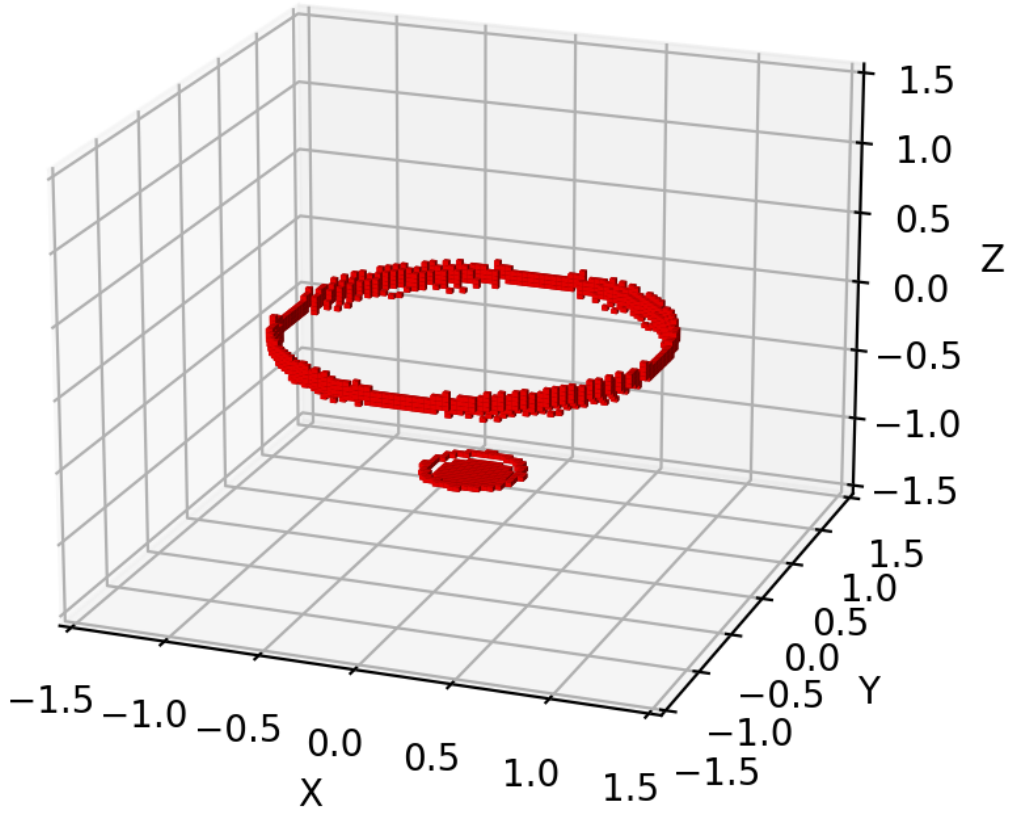
Sphere = x^2 + y^2 + z^2 -1 and Elliptic Paraboloid = x^2 + y^2 - z – 1

GeoGebra:

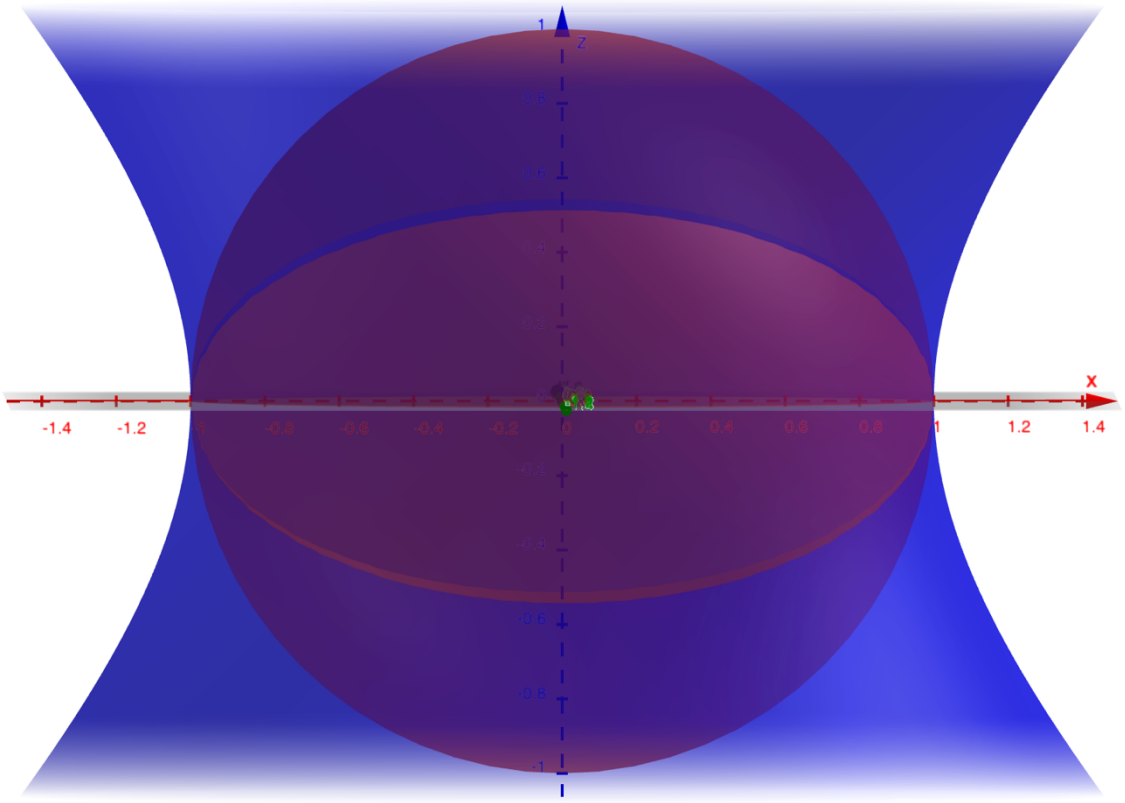


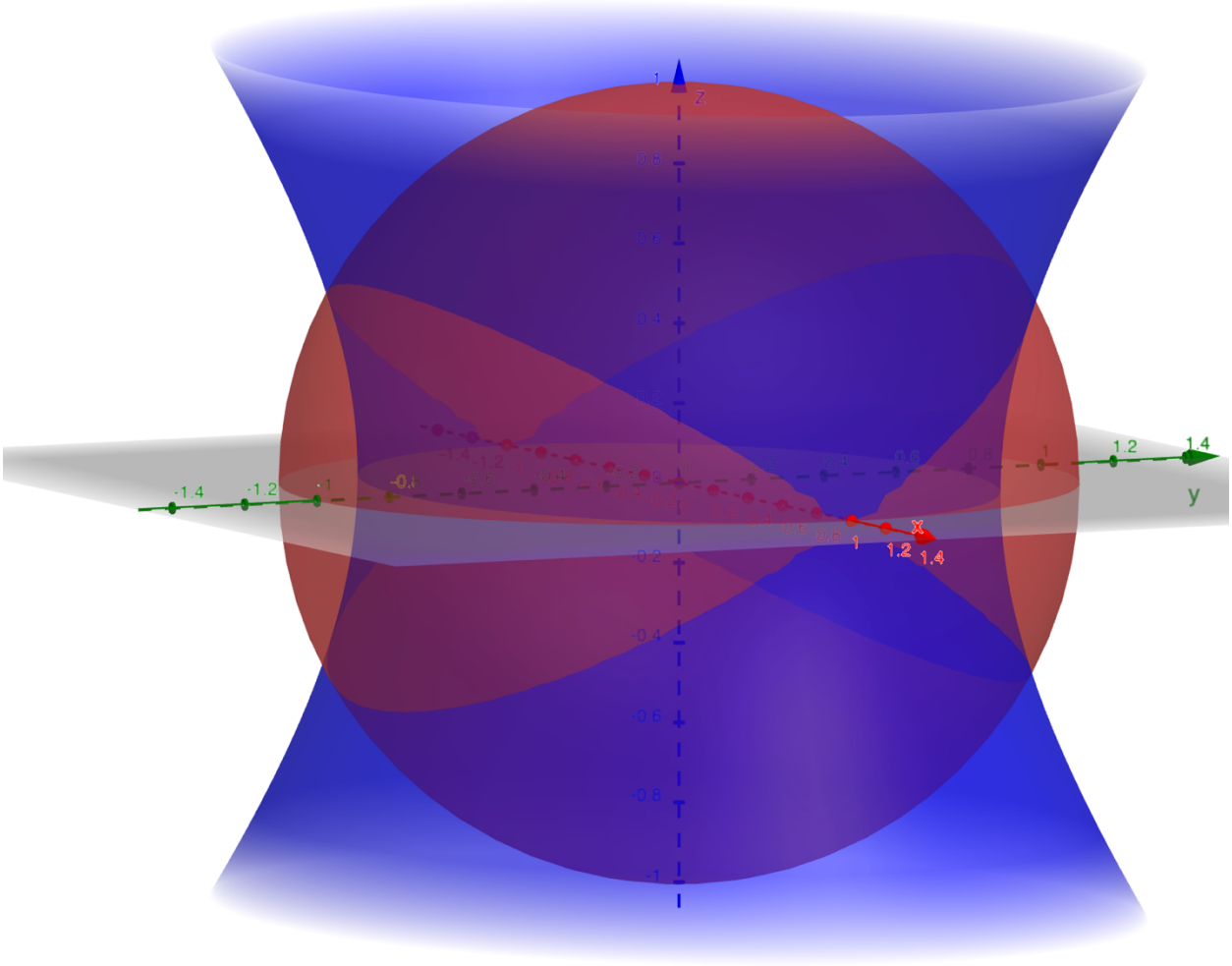


Code:

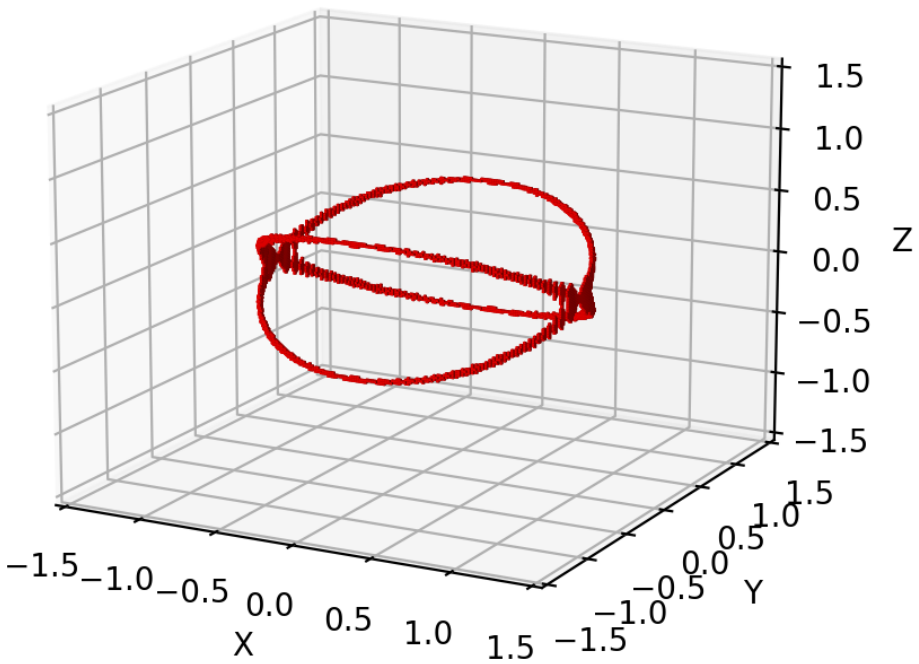


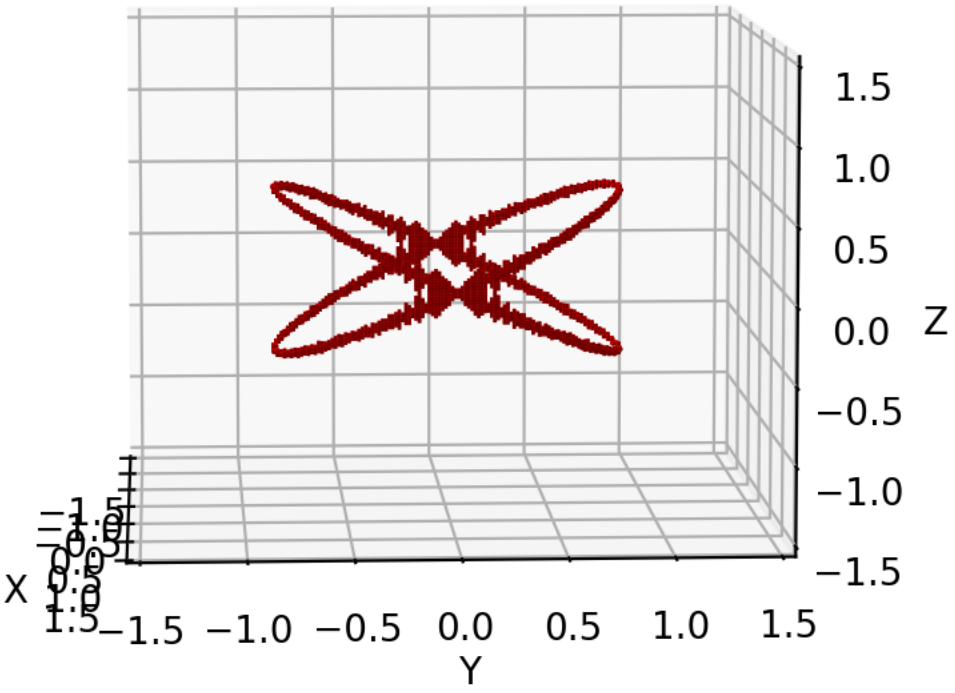
2. Sphere and Hyperboloid of one sheet. Sphere = x^2 + y^2 + z^2 -1 and Hyperboloid of one sheet = x^2 + (y^2)/0.75^2 - z – 1


z
x
1
-1.4
-1.2
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4


z
y
x
1
0.8
0.6
0.4
0.2
-0.2
-0.4
-0.6
-0.8
-1
-1.4
-1.2
-1
1.2
1.4

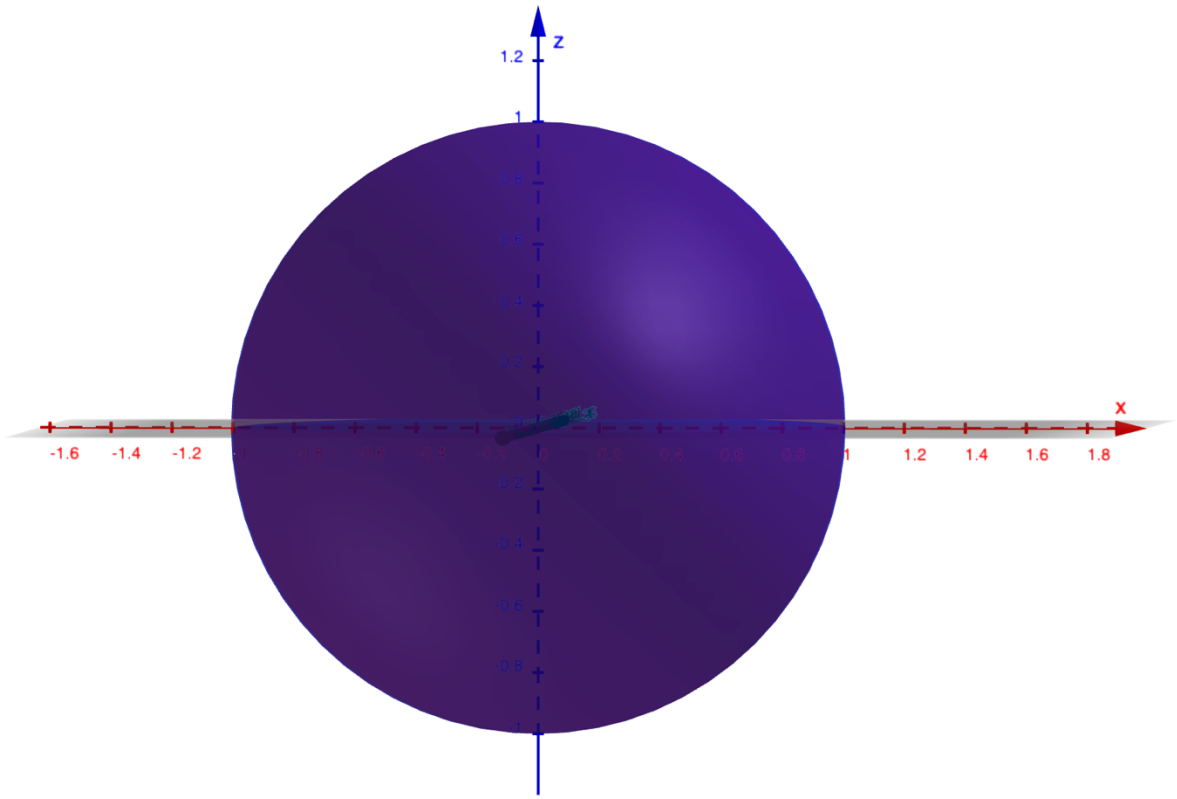
Code:

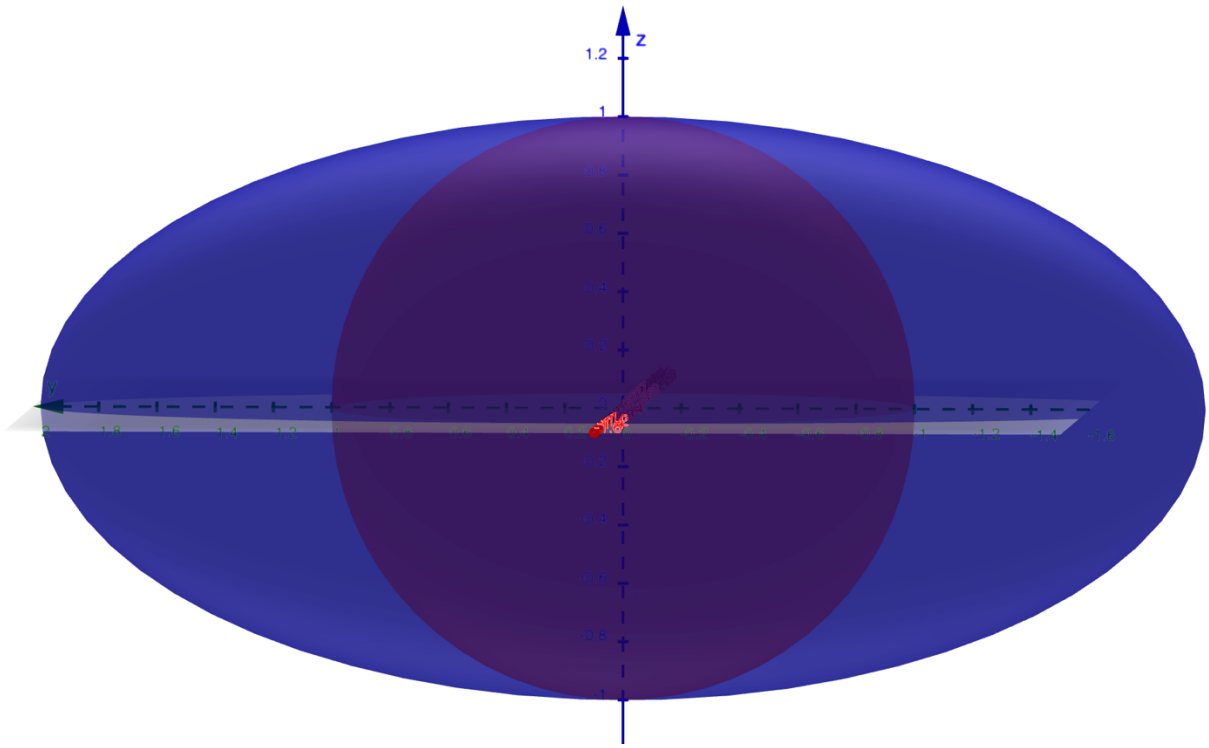




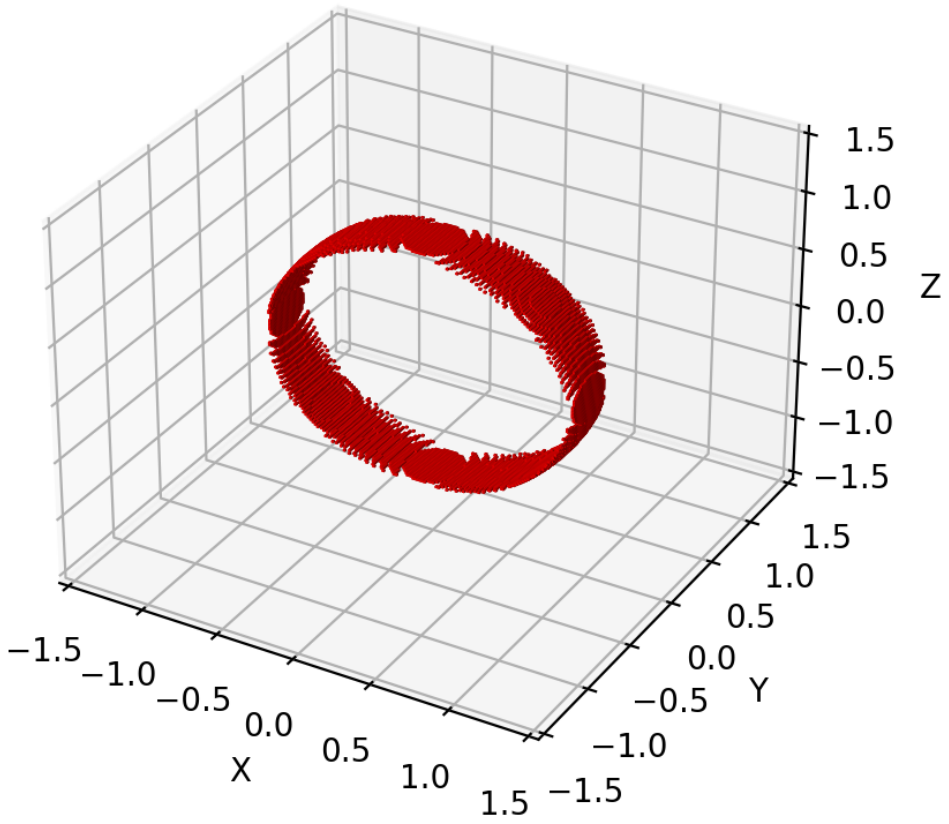
3. Sphere and Ellipsoid. Ellipsoid: x^2 +(y^2)/4 + z^2 = 1. Sphere: x^2 + y^2 + z^2 = 1

Geogebra:


z
x
1.2
1
0.8
0.6
0.4
0.2
-1.6
-1.4
-1.2
1.2
1.4
1.6
1.8

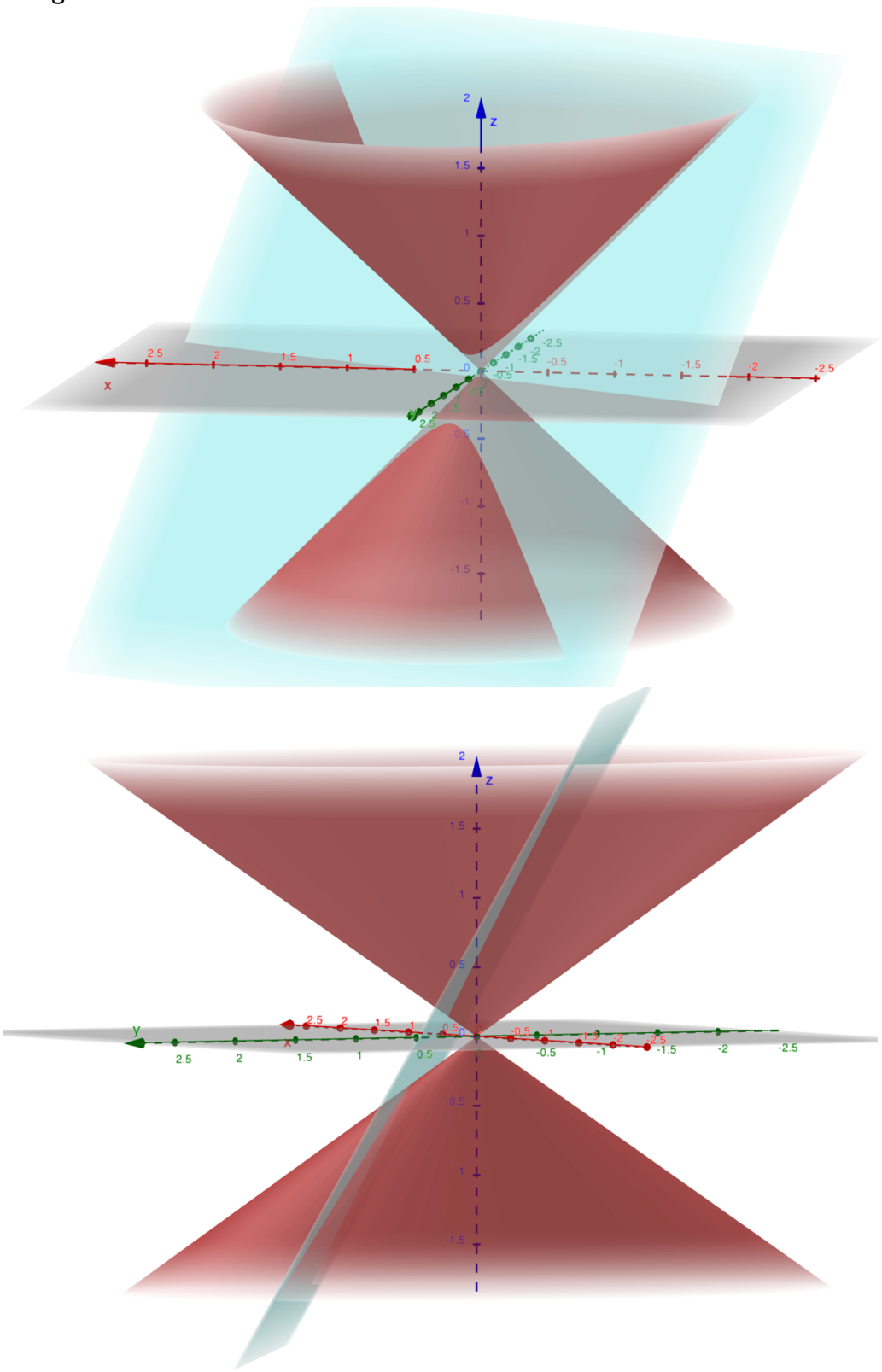

z
y
1.2
1
0.8
0.6
0.4
0.2
-0.2
-0.4
-0.6
-0.8
-1

Code:



4. Hyperplane and Elliptic Cone. Elliptic Cone: (x^2)/4 +(y^2)/9 = (z^2)/ 4.
   Hyperplane: 2x +3 y = -2z + 1

Geogebra:



My code:

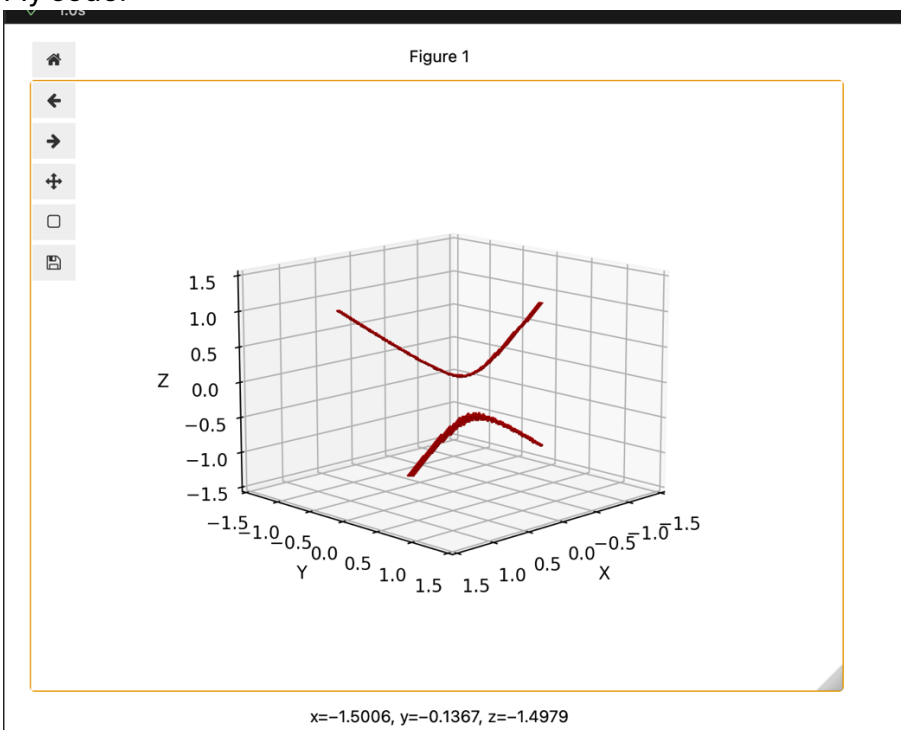


Figure 1
Z
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
Y
X
x=−1.5006, y=−0.1367, z=−1.4979

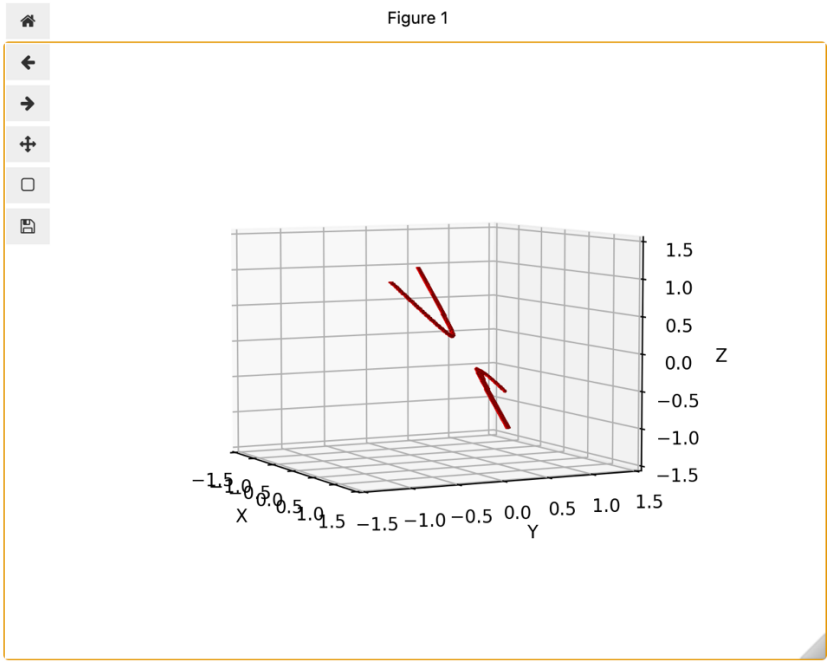


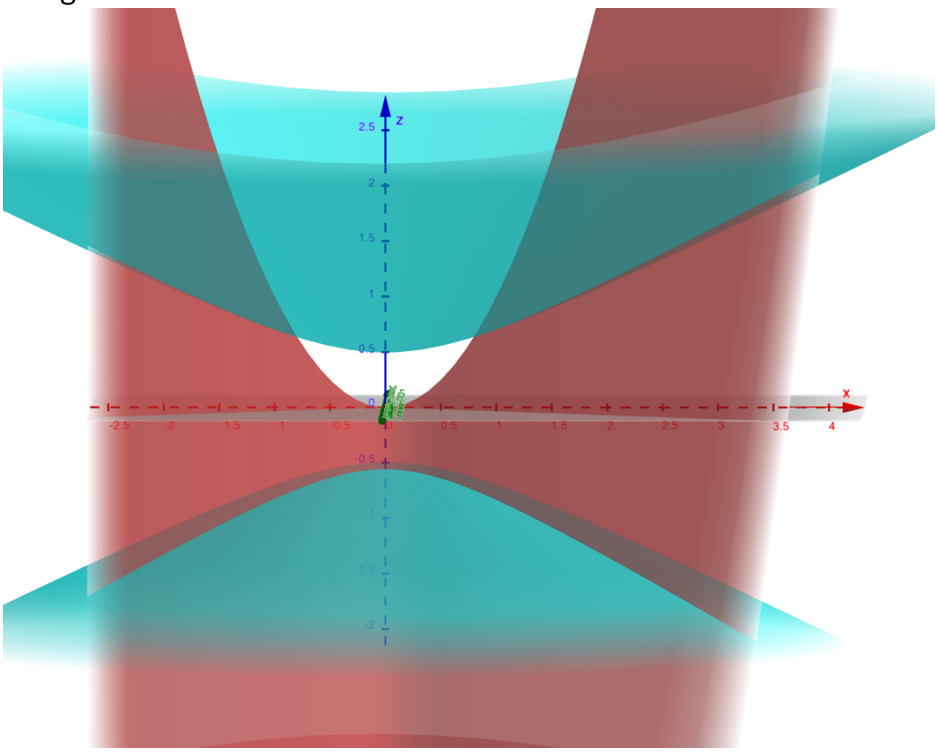
Figure 1
Z
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
X
Y

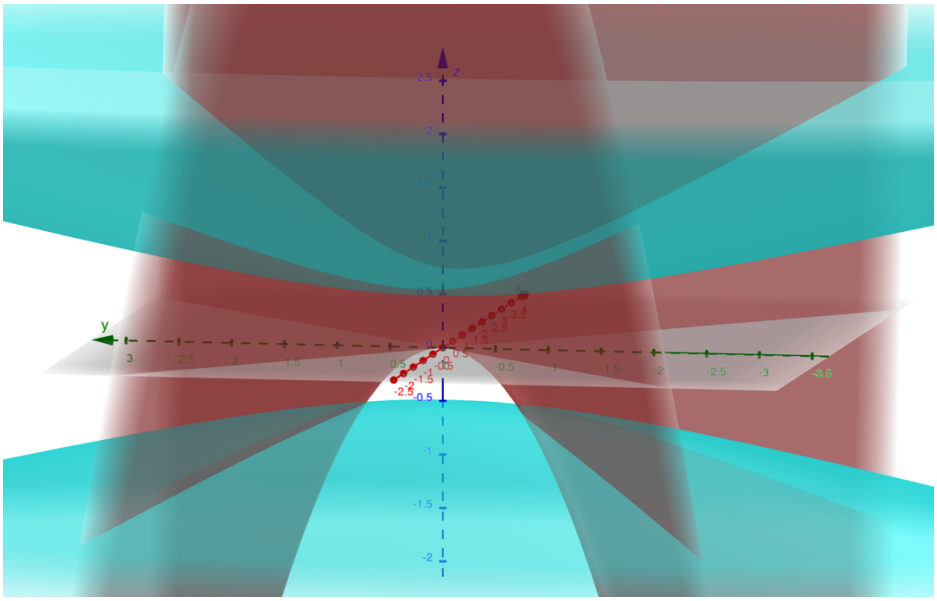
5. Hyperboloid of Two Sheets and Hyperbolic Paraboloid: Hyperboloid of Two Sheets:

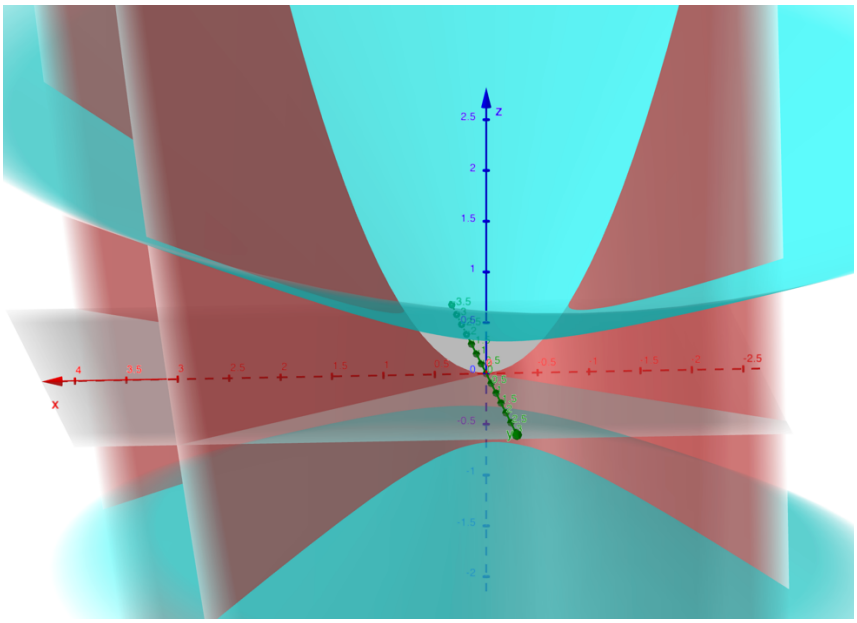
Hyperboloid of Two Sheets: x^2 + (y^2)/4 = (z^2)/0.25 - 1

Hyperbolic Paraboloid: (x^2) – (y^2) = z

Geogebra:







My Code:

Figure 6

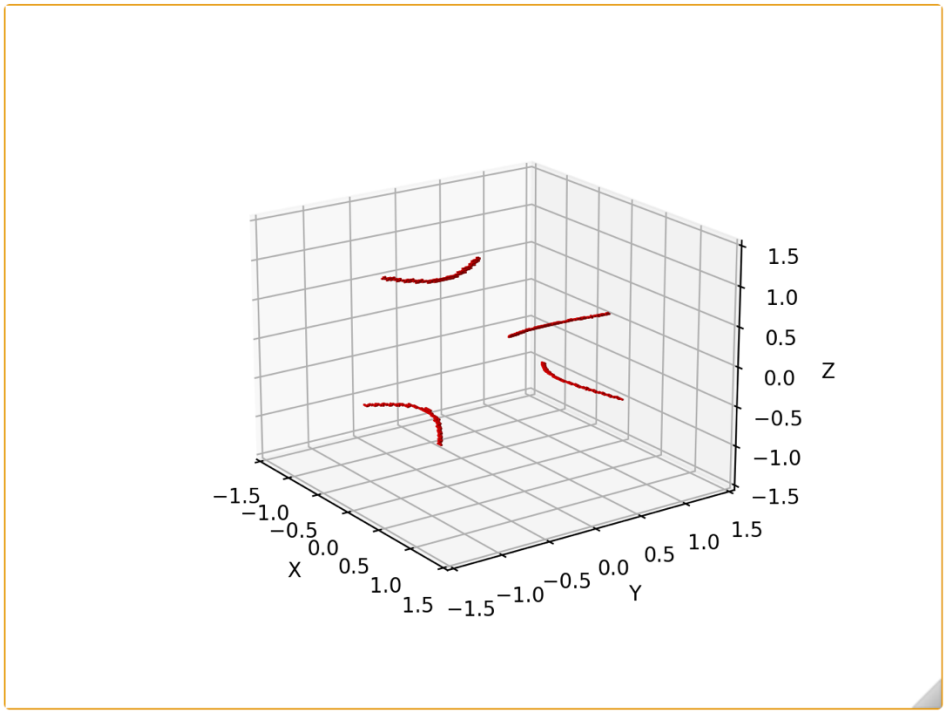
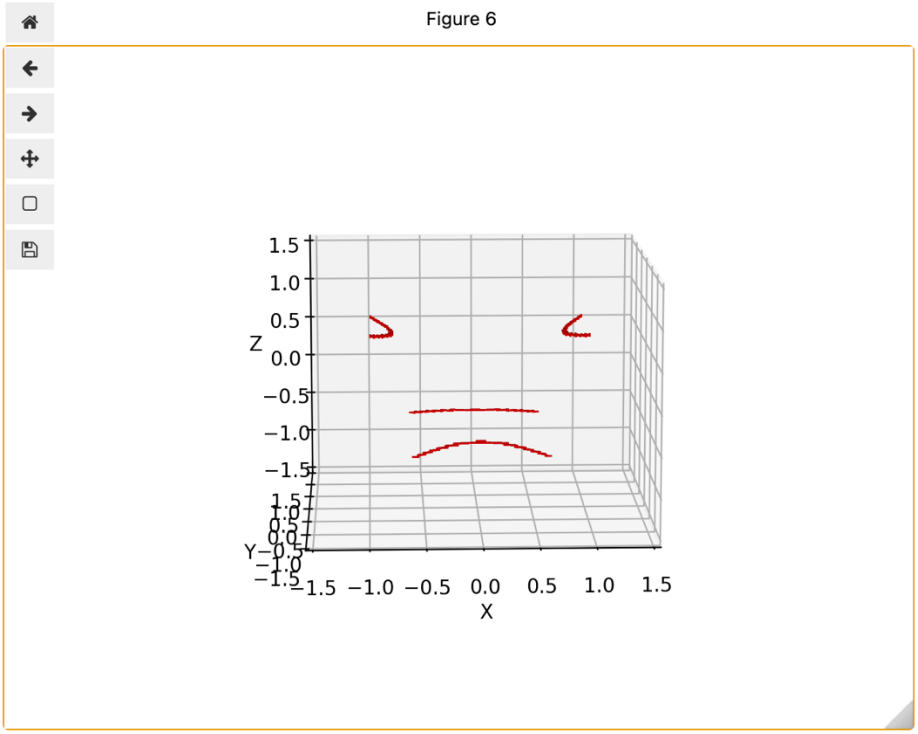
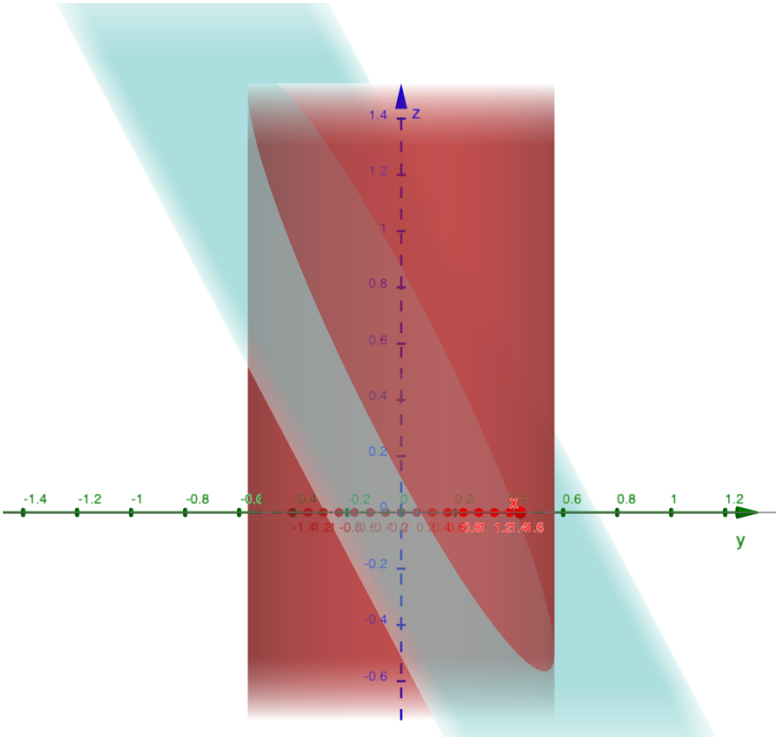
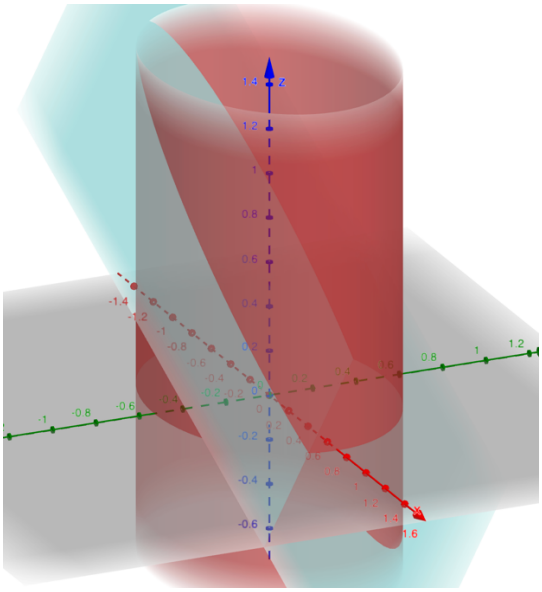


Figure 6

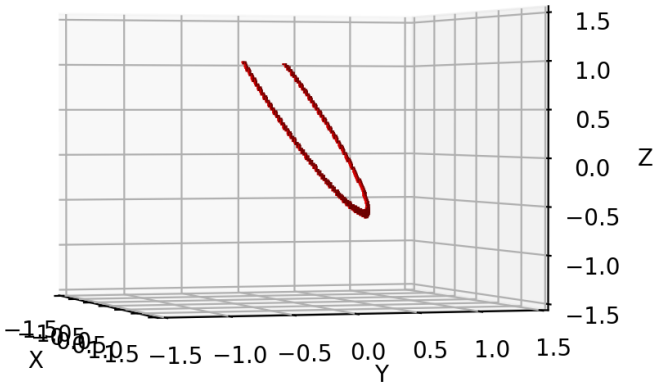


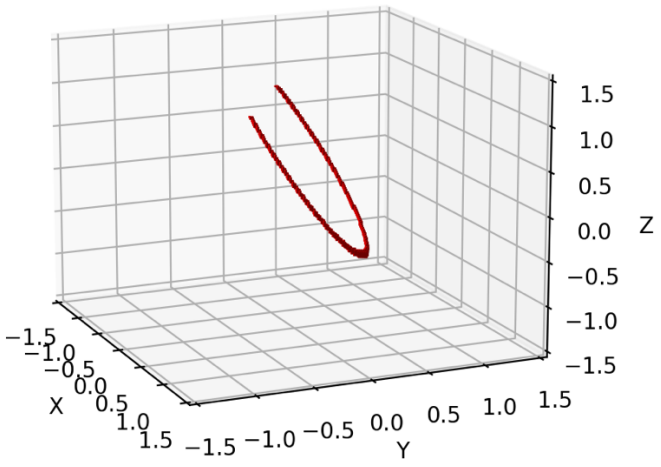
6. Elliptic cylinder and Hyperplane.
   Elliptic Cylinder: x^2 + (y^2)/0.5625 = 0.5 (z from -1 to 1)
   Hyperplane: 2x + 3y = -2z + 1
   Geogebra:





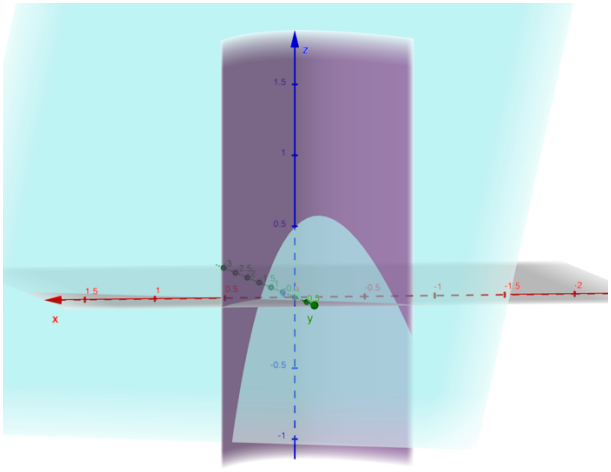
My Code:

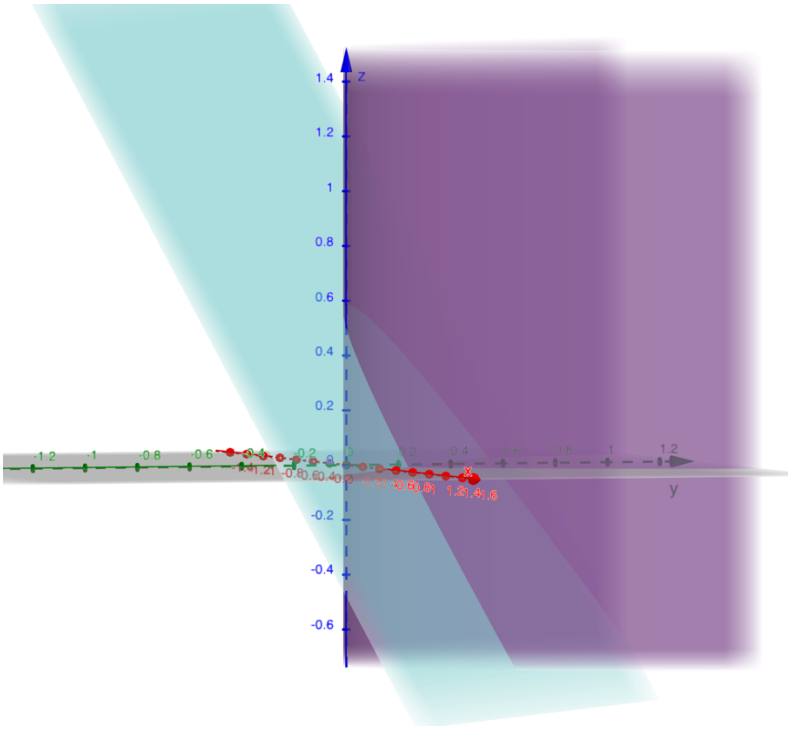

1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
Z
X
Y
−1.5 −1.0 −0.5 0.0 0.5 1.0 1.5


1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
Z
X
Y
−1.5 −1.0 −0.5 0.0 0.5 1.0 1.5

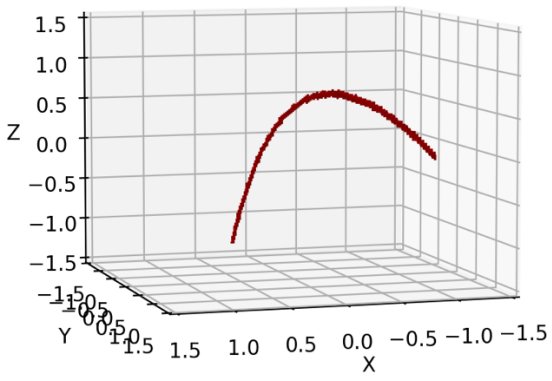
7. Parabolic Cylinder and Hyperplane:
   Parabolic Cylinder: y -2x^2 = 0
   Hyperplane: 2x + 3y = -2z + 1

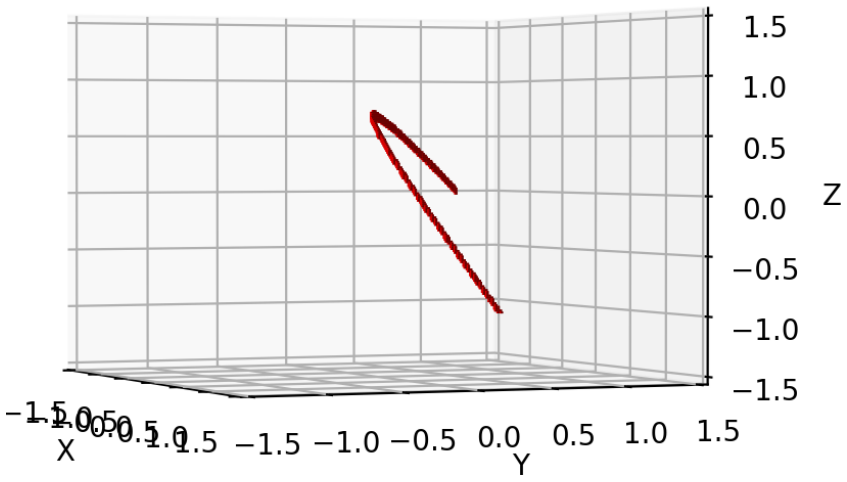
   Geogebra





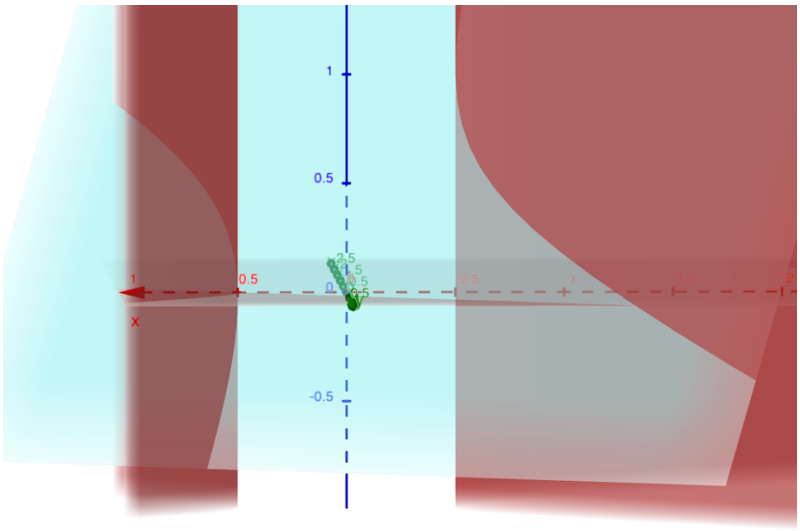
My Code:

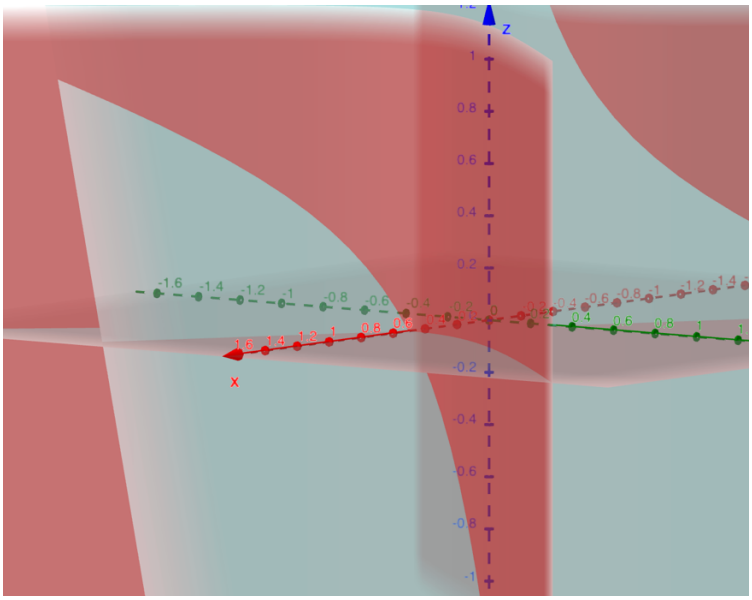




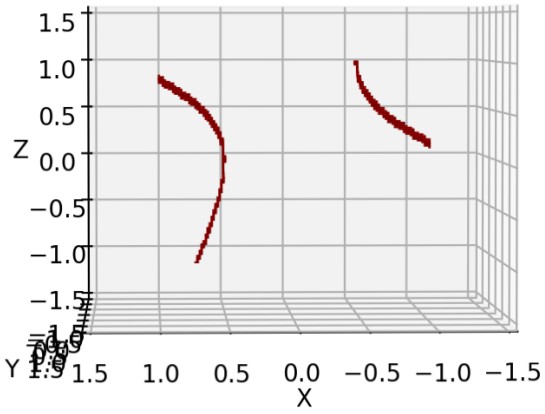
8. Hyperbolic Cylinder and Hyperplane:
   Hyperbolic Cylinder: (x^2)/0.25 + (y^2)/4 = 1
   Hyperplane: 2x + 3y = -2z + 1

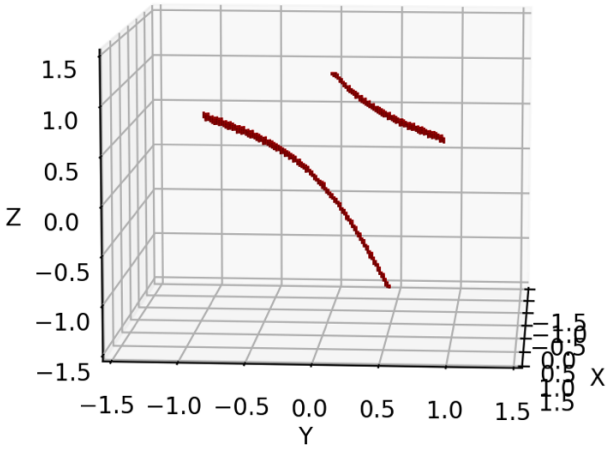
   Geogebra:





My Code:


1.5
1.0
0.5
Z 0.0
−0.5
−1.0
−1.5
1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5
X

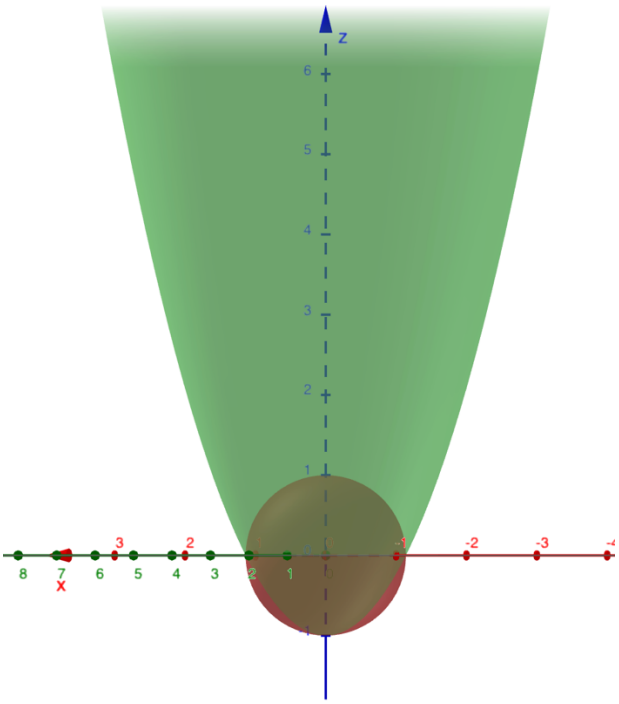

1.5
1.0
0.5
Z 0.0
−0.5
−1.0
−1.5
−1.5 −1.0 −0.5 0.0 0.5 1.0 1.5
Y
X

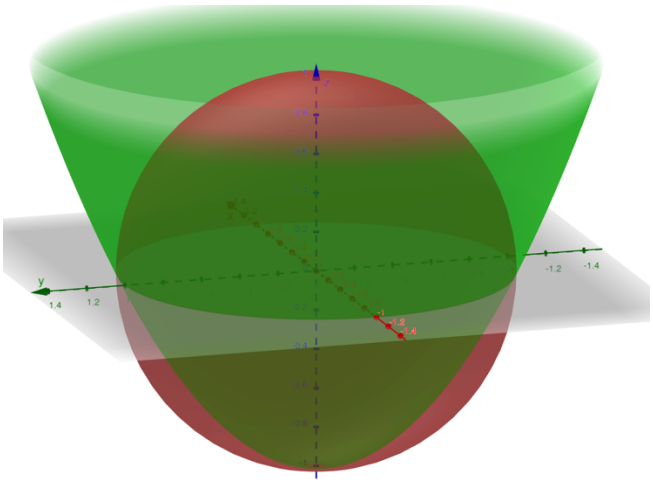
The following code examples are computed using the manual function, which is why the first example is a repeated test of the first example of this document, with the exception that the equation for the elliptic paraboloid was provided via a string for my function to parse automatically. The two following examples are based on examples of Dogan's Thesis.

9. Sphere and Elliptic paraboloid:

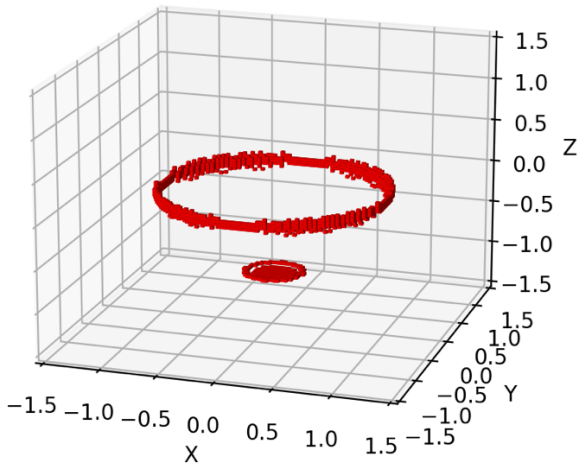
Sphere = x^2 + y^2 + z^2 -1 and Elliptic Paraboloid (manual) = x^2 + y^2 - z – 1

GeoGebra:





Code:



10. F = x^4 + 2x^2y^2 + y^4 -2x^2 – 2y^2 + 1 – z and G = 0.5 – z

Dogan's Experiment 3:

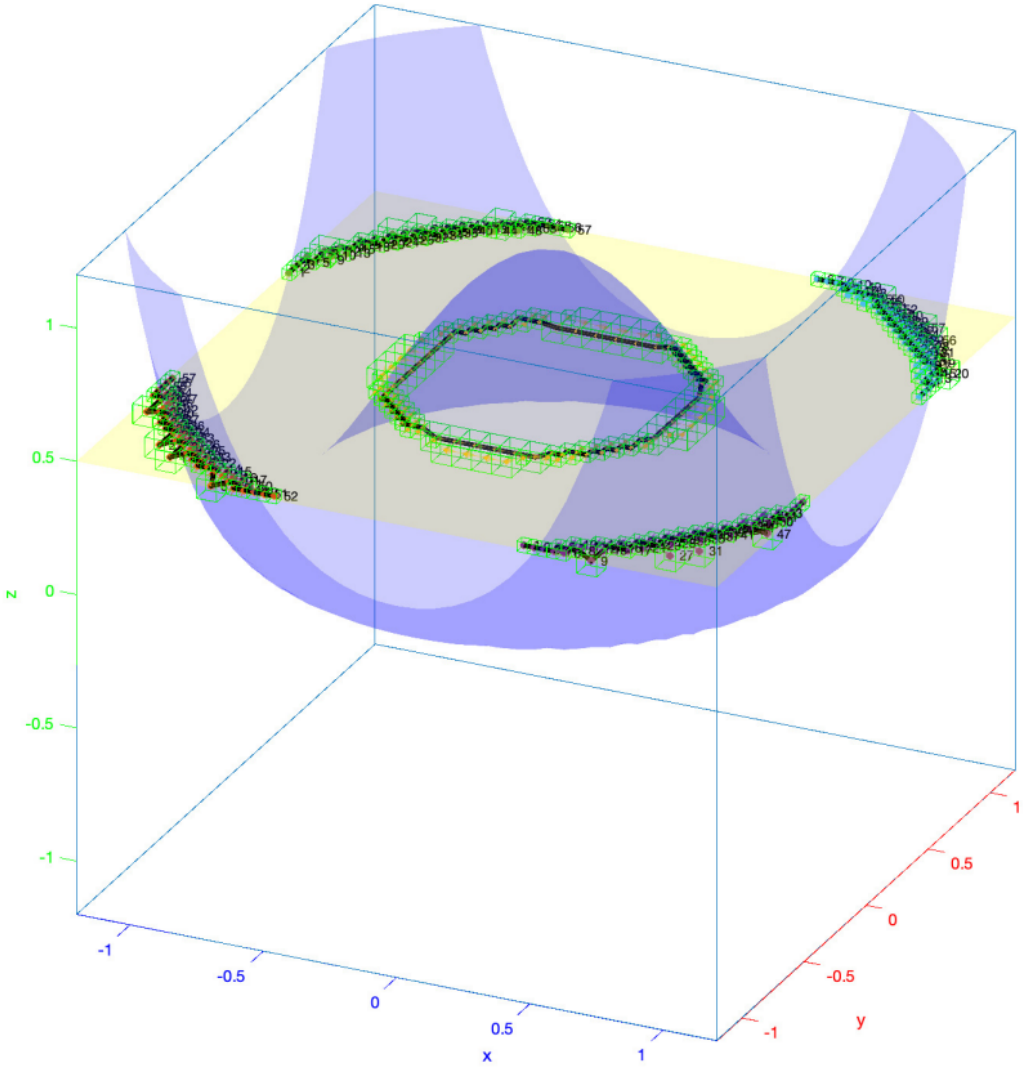
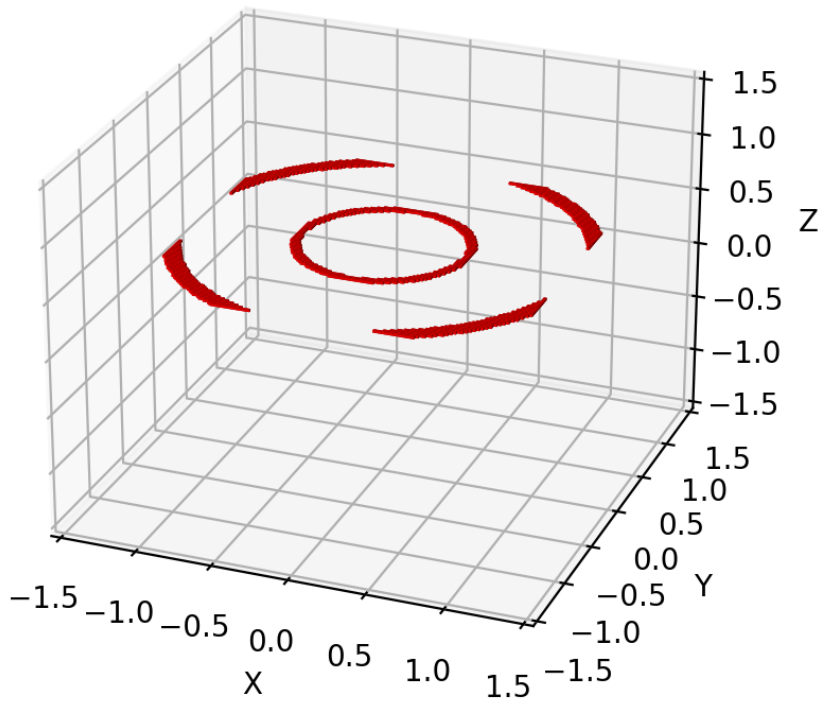


Figure 4.5: The output for experiment 3 seen in 3D

My Code:



11. F = x^2 + y^2 – z^2 – 2 and G = x^2 -y^2 + z^2 – 1

Dogan's Experiment 4:

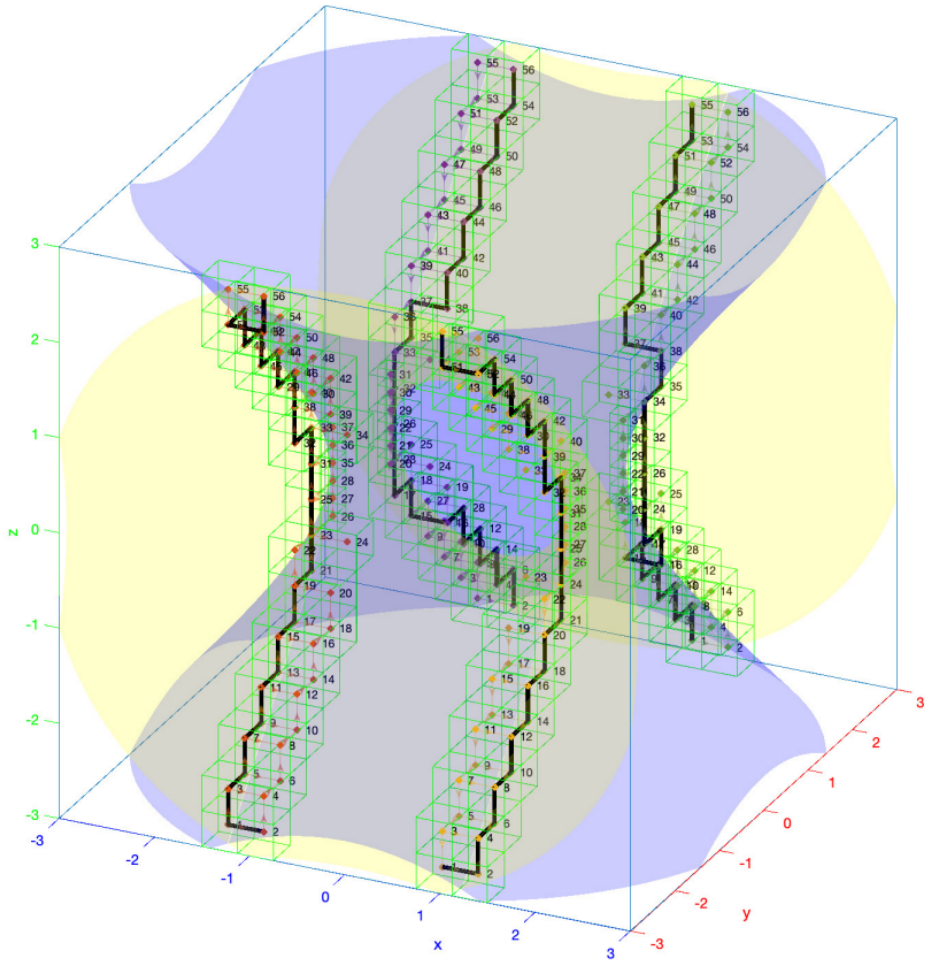


Figure 4.7: The output for experiment 4 seen in 3D

My Code: