# NAME = PANKAJ KUMAR SAINI

# ROLL NO = 2019IMG-044

CG LAB ASSIGNMENT-1

# TASK-1 A

# ELLIPSOID

# (BELOW PHOTO CONTAIN CODE AND PHOTO FOR ELLIPSOID)

Computer Graphics - Jupyter Not

localhost:8888/notebooks/Desktop/Computer%20Graphics.ipynb

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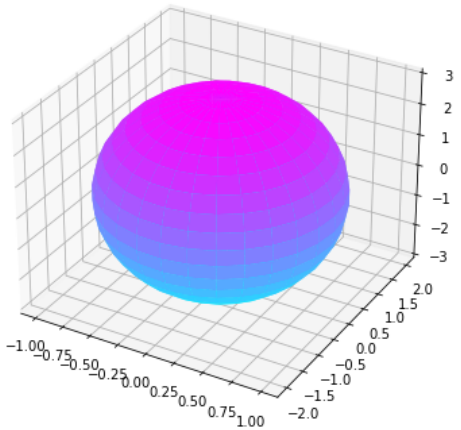
Run Code

In [17]:
```
import matplotlib.pyplot as plt
import numpy as np

a, b, c = 1,2,3

plt.rcParams["figure.figsize"] = [10.00, 5.00]
plt.rcParams["figure.autolayout"] = True
fig = plt.figure()
ax = fig.add_subplot(projection='3d')
u, v = np.mgrid[0:2 * np.pi:30j, 0:np.pi:20j]
x = (np.cos(u) * np.sin(v))*a
y = (np.sin(u) * np.sin(v))*b
z = (np.cos(v))*c
ax.plot_surface(x, y, z, cmap='cool')
plt.show()
```




In [ ]:

ENG 11:41 24-09-2021

# TASK-1 B

# TORUS

# (BELOW PHOTO CONTAIN CODE AND PHOTO FOR ELLIPSOID)

Computer Graphics - Jupyter Not

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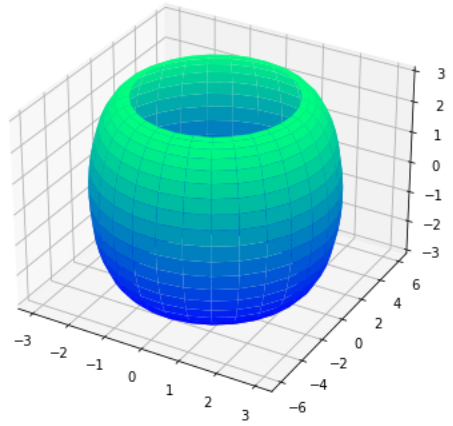
Run Code

In [18]:
```
import matplotlib.pyplot as plt
import numpy as np

a, b, c, r = 1,2,3,2

plt.rcParams["figure.figsize"] = [10.00, 5.00]
plt.rcParams["figure.autolayout"] = True
fig = plt.figure()
ax = fig.add_subplot(projection='3d')
u, v = np.mgrid[0:2 * np.pi:30j, 0:np.pi:20j]
x = a * (r + np.sin(v))*np.cos(u)
y =  b * (r + np.sin(v))*np.sin(u)
z = c * np.cos(v)
ax.plot_surface(x, y, z,cmap='winter')
plt.show()
```




In [ ]:

ENG 11:41 24-09-2021

# TASK 2  SUPER-ELLIPSOID

HERE I AM PASTING ONLY ONE CODE AND IT IS SAME FOR ALL GRAPH. WE JUST CHANGED THE VALUES OF S1 AND S2 AND REMAINING CODE IS SAME FOR ALL SCREENSHOTS

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Run Code

In [20]:

```
import matplotlib.pyplot as plt
import numpy as np
a, b, c = 1,2,3
s1,s2 = 1,0.2

plt.rcParams["figure.figsize"] = [10.00, 5.00]
plt.rcParams["figure.autolayout"] = True
fig = plt.figure()
ax = fig.add_subplot(111,projection='3d')

v,u = np.mgrid[-0.5*np.pi:0.5 * np.pi:100j, -1*np.pi:1*np.pi:100j]
x = ((np.abs(np.cos(u)))**s2 * np.sin(v)**s1)*a
y = ((np.abs(np.sin(u)))**s2 * np.sin(v)**s1)*b
z = (np.cos(v)**s1)*c

ax.plot_surface(x, y,z,  alpha = 1, rstride=1, cstride=1, cmap="cool", linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(-x, y,z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(x, -y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(x, y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)

ax.view_init(20,10)
plt.show()

plt.rcParams["figure.figsize"] = [10.00, 5.00]
plt.rcParams["figure.autolayout"] = True
fig = plt.figure()
ax = fig.add_subplot(111,projection='3d')

v,u = np.mgrid[-0.5*np.pi:0.5 * np.pi:100j, -1*np.pi:1*np.pi:100j]
x = ((np.abs(np.cos(u)))**s2 * np.sin(v)**s1)*a
y = ((np.abs(np.sin(u)))**s2 * np.sin(v)**s1)*b
z = (np.cos(v)**s1)*c

ax.plot_surface(x, y,z,  alpha = 1, rstride=1, cstride=1, cmap="cool", linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(-x, y,z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(x, -y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(x, y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)

ax.view_init(10,60)
plt.show()
```

ENG 11:57 24-09-2021

ABOVE CODE IS FOR  SUPER ELLIPSOID
HERE WE WILL CHANGE THE VALUES OF S1 AND S2 AND WILL GET DIFFERENT VARIATIONS

AND WE ARE PLOTING 2 GRAPH IN ONE SCREENSHOT
BOTH GRAPH ARE FROM DIFFERENT ANGLE

FIRST VIEW FROM (20,10)
SECOND VIEW FROM(10,60)

# WHEN S1=1 AND S2=0.2

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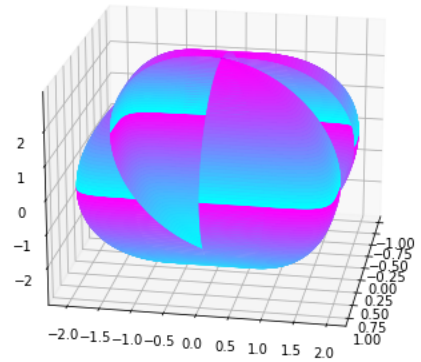
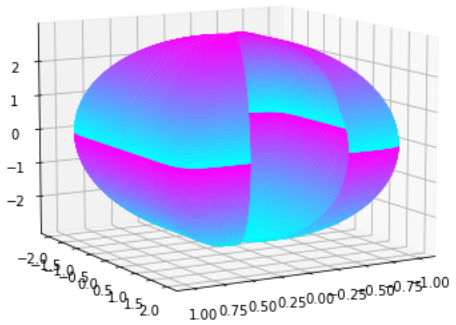
Run Code

```
ax.plot_surface(x, -y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)
ax.plot_surface(x, y,-z,  alpha = 1, rstride=1, cstride=1, cmap="cool",linewidth=0.5, antialiased=True, zorder = 0.3)

ax.view_init(10,60)
plt.show()
```

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# WHEN S1=1 AND S2=0.4

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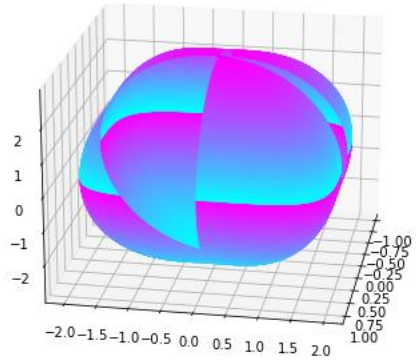


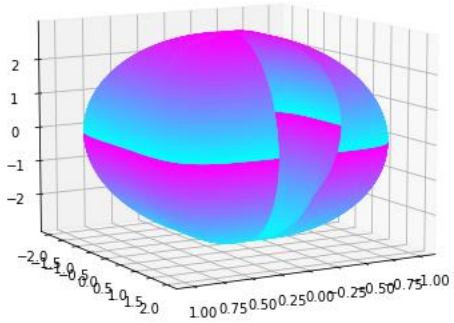


In [ ]:

ENG 11:58 24-09-2021

# WHEN S1=1 AND S2=0.8

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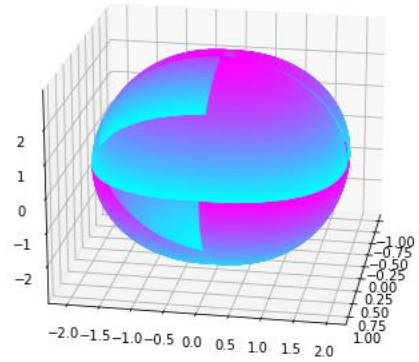


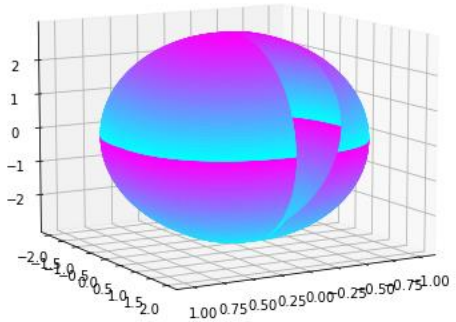


In [ ]:

ENG 11:59 24-09-2021

# WHEN S1=1 AND S2=1

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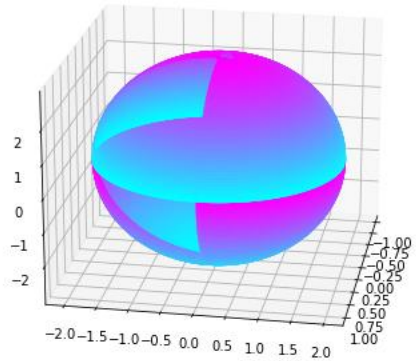


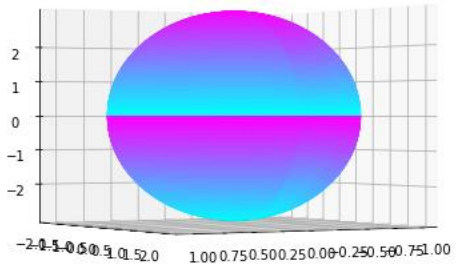


In [ ]:

ENG 12:01 24-09-2021

# WHEN S1=1 AND S2=1.5

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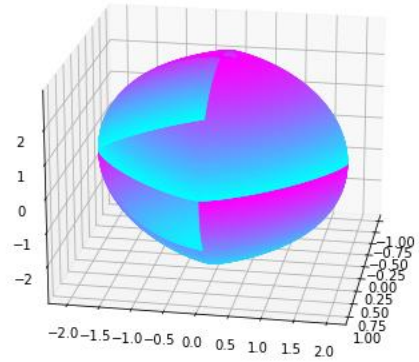

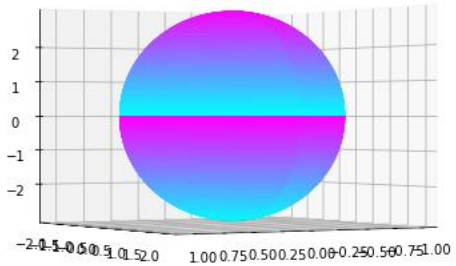

In [ ]:

ENG 12:04 24-09-2021

# WHEN S1=1 AND S2=2

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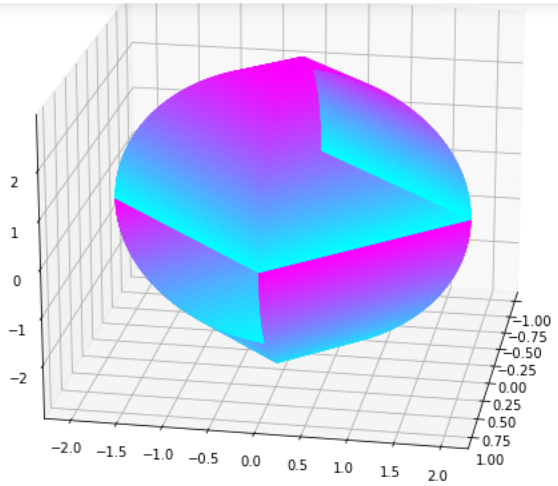
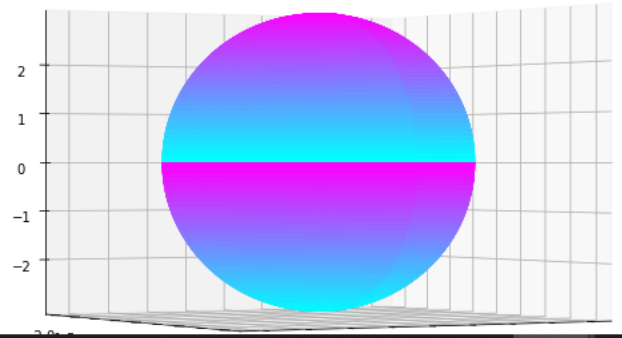
Run Code




ENG 12:11 24-09-2021

ABOVE ALL GRAPH ARE FOR TASK 2 A

AND NOW FROM HERE WE WILL START TASK 2 B

CODE IS ALSO SAME
JUST CHANGING VALUES OF S1 AND S2

IN TASK B S2 =1 IS FIX AND S1 WILL CHANGE

# WHEN S1=0.2 AND S2=1

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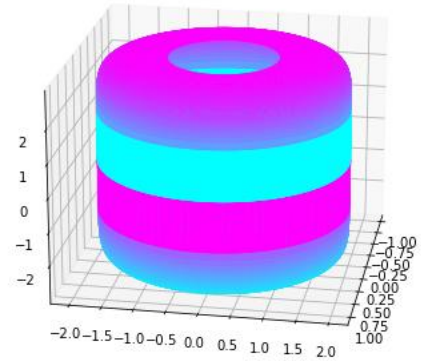
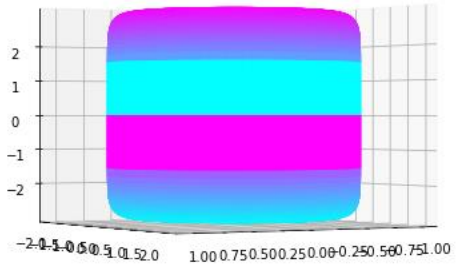
Run Code

```
ax.view_init(0,60)
plt.show()
```

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# WHEN S1=0.4 AND S2=1

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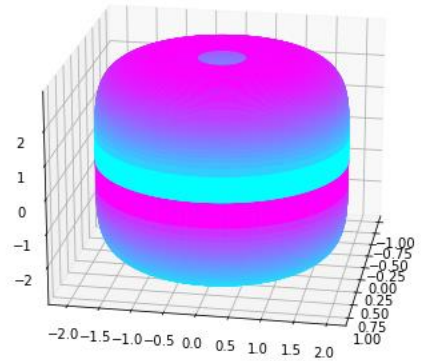
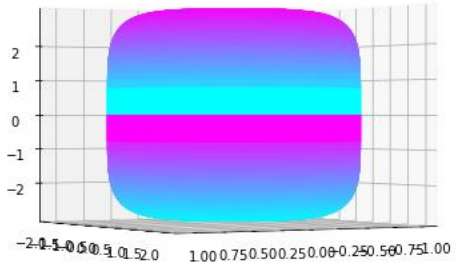
```
ax.view_init(0,60)
plt.show()
```

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# WHEN S1=0.8 AND S2=1

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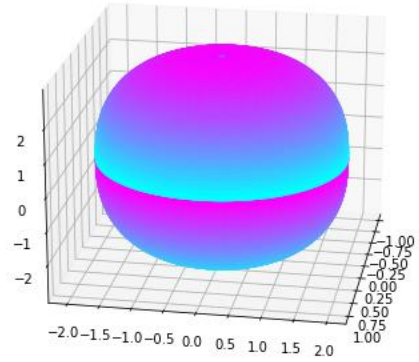
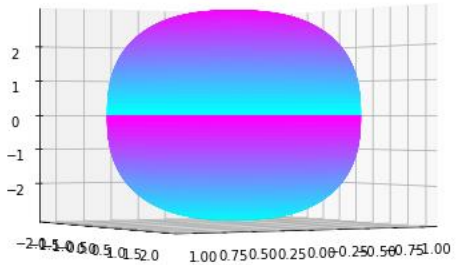
Run Code

```
ax.view_init(0,60)
plt.show()
```

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# WHEN S1=1 AND S2=1

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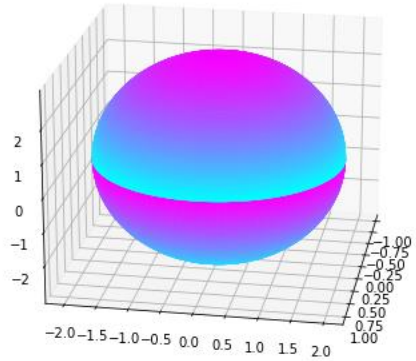


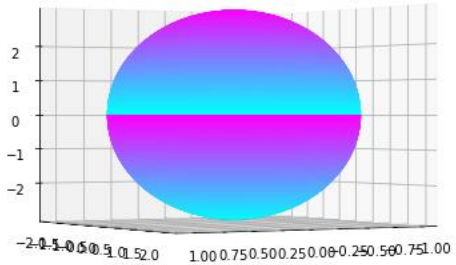


In [ ]:

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# WHEN S1=1.5 AND S2=1

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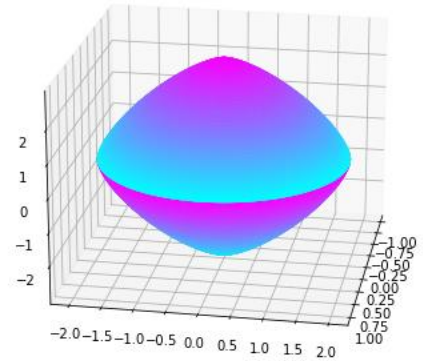
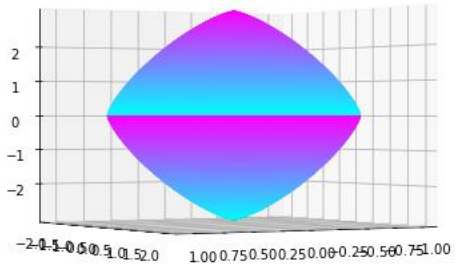
Trusted Python 3

Run Code

```
plt.show()
```




In [ ]:

ENG 12:24 24-09-2021

THESE ARE ALL GRAPHS FOR ALL VALUES

I AM ATTACHING CODE OF ELLIPSOID, TORUS AND SUPER-ELLIPSOID IN CLASSROOM