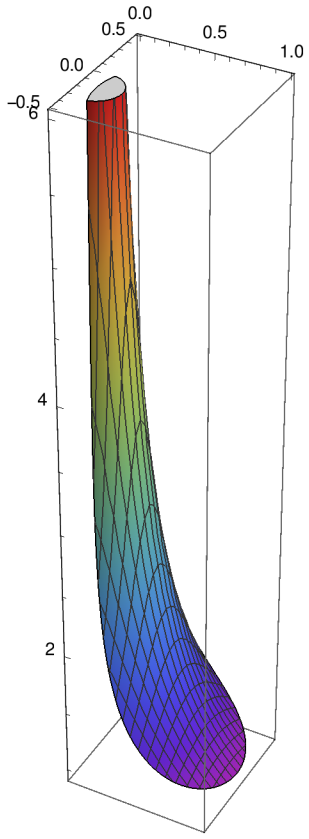
In[10]:=
```
SetOptions[Plot3D(*Or whichever plot you desire*),
  ColorFunction → "Rainbow"(*One of many options*)];


(*1*)
Plot3D[1 / Sqrt[{x^2 + y^2}], {x, 0, 1}, {y, -0.5, 0.5},
 RegionFunction → Function[{x, y, z}, x^2 + y^2 < x], BoxRatios → Automatic]
```

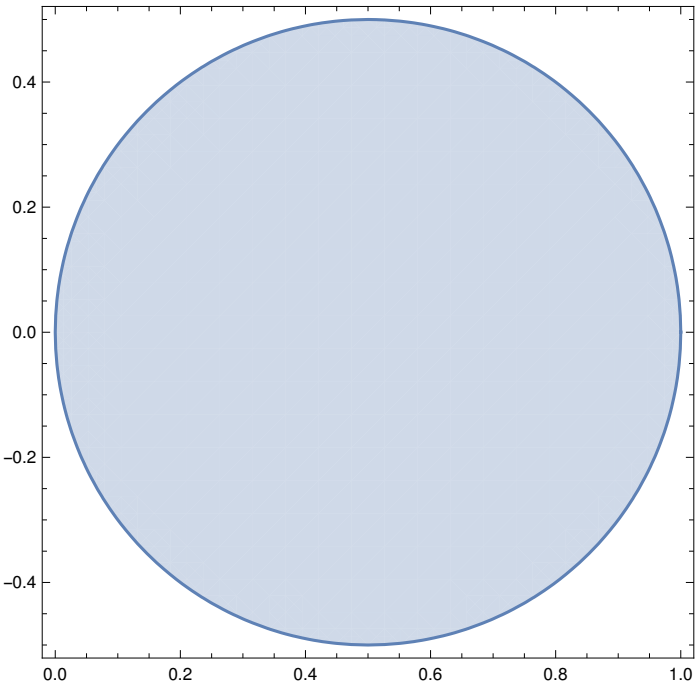
Out[21]=



In[20]:=

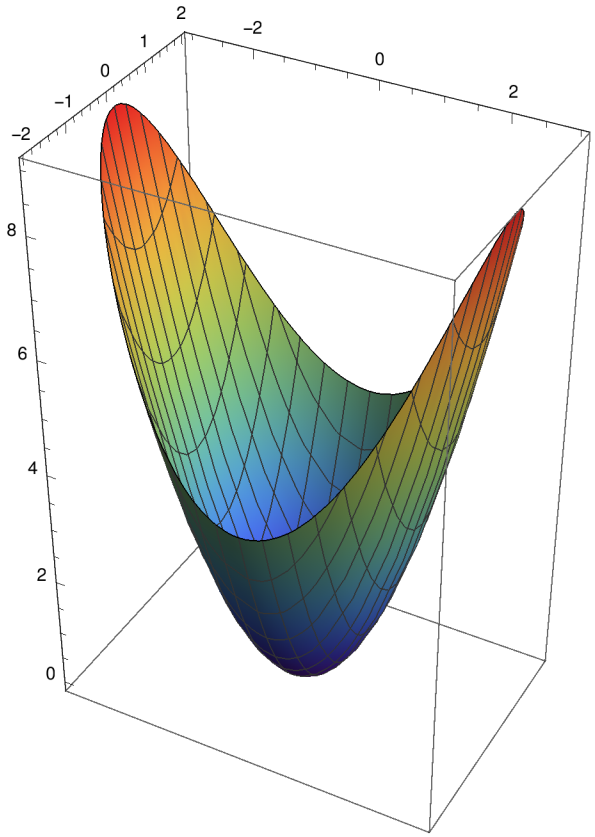
```
RegionPlot[x^2 + y^2 < x, {x, 0, 1}, {y, -0.5, 0.5}, AspectRatio → Automatic]
```

Out[20]=



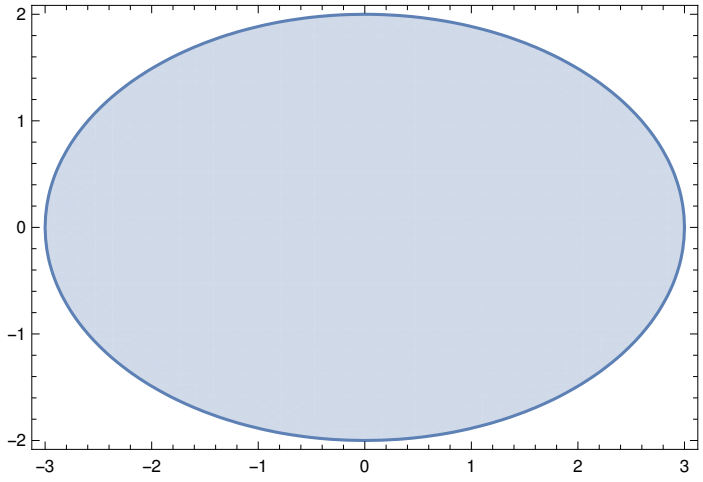
In[11]:=
```
(*2*)
Plot3D[{x^2 + y^2}, {x, -3, 3}, {y, -2, 2},
 RegionFunction → Function[{x, y, z}, 4 x^2 + 9 y^2 < 36], BoxRatios → Automatic]
```

Out[11]=



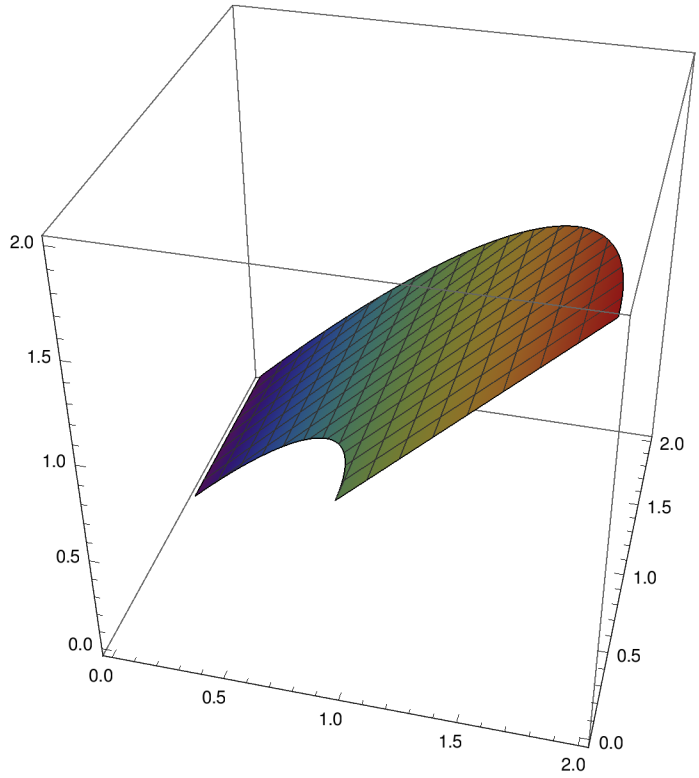
In[14]:=
```
RegionPlot[4 x^2 + 9 y^2 < 36, {x, -3, 3}, {y, -2, 2}, AspectRatio → Automatic]
```

Out[14]=

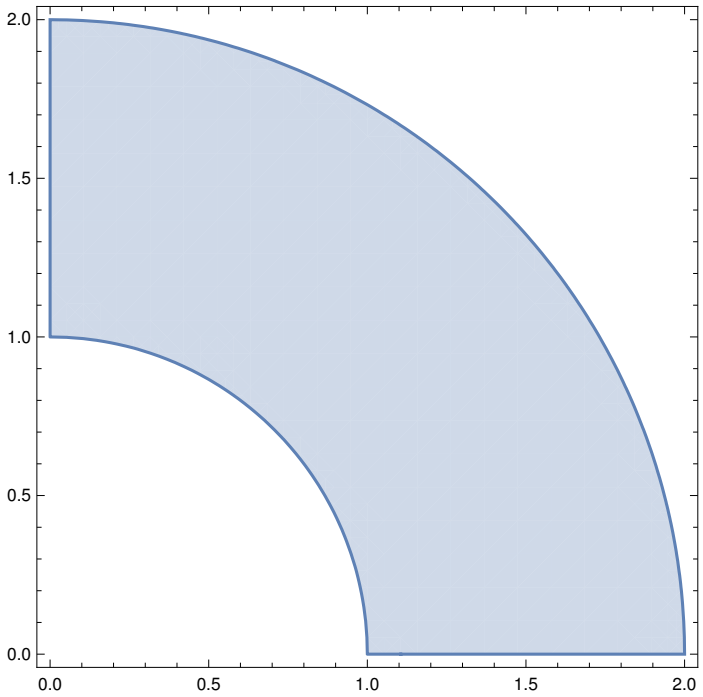



```
(*3*)

Plot3D[{x}, {x, 0, 2}, {y, 0, 2},
 RegionFunction → Function[{x, y, z}, 1 < x^2 + y^2 < 4], BoxRatios → Automatic]
```

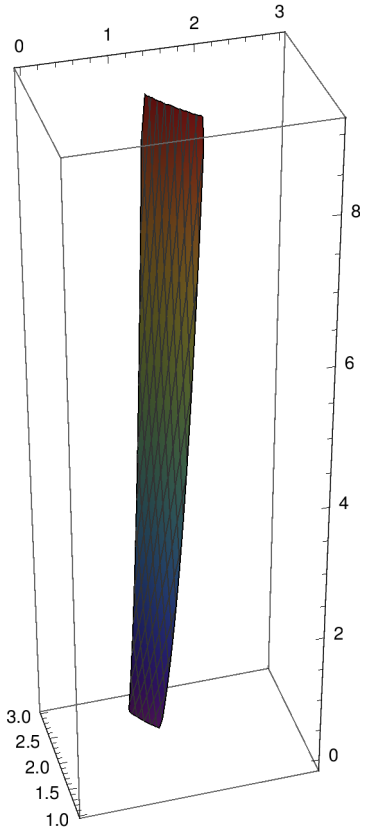


```
RegionPlot[1 < x^2 + y^2 < 4, {x, 0, 2}, {y, 0, 2}]
```



```
(*4*)
Plot3D[{x^2 y^2}, {x, 0, 3}, {y, 1, 3},
 RegionFunction → Function[{x, y, z}, 1 < x * y < 3 && x < y < 2 x], BoxRatios → Automatic]
```

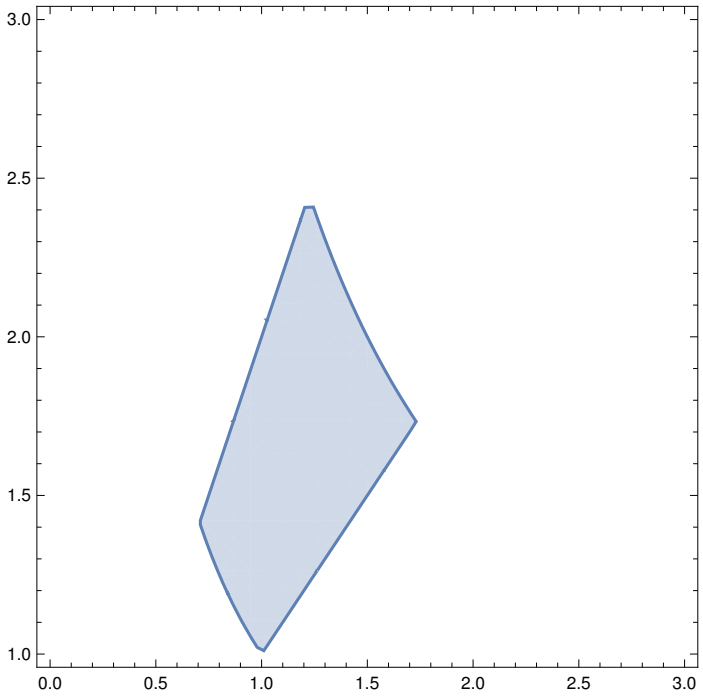
Out[35]=



In[36]:=

```
RegionPlot[1 < x * y < 3 && x < y < 2 x, {x, 0, 3}, {y, 1, 3}]
```

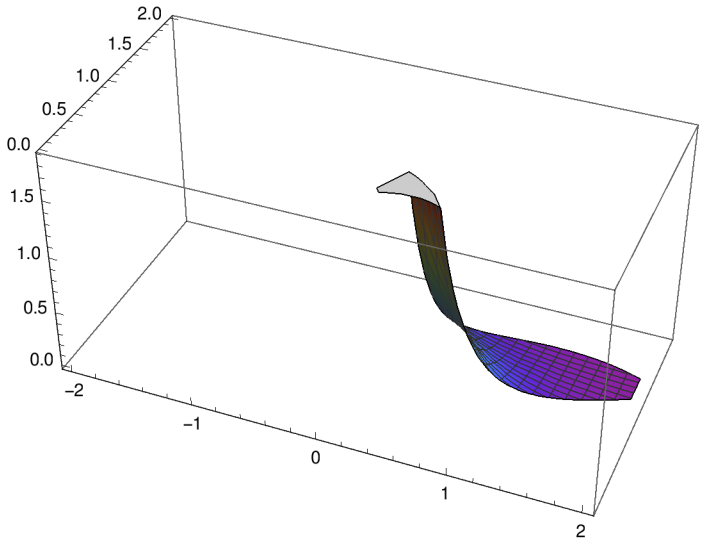
Out[36]=



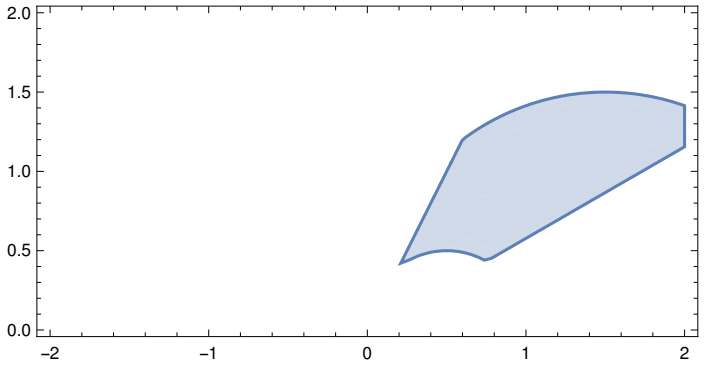
In[54]:=

```
(*5*)
Plot3D[{1 / (x^2 + y^2) ^2}, {x, -2, 2}, {y, 0, 2},
 RegionFunction → Function[{x, y, z}, x / Sqrt[3] < y < 2 x && x < x^2 + y^2 < 3 x],
 BoxRatios → Automatic]
RegionPlot[x / Sqrt[3] < y < 2 x && x < x^2 + y^2 < 3 x,
 {x, -2, 2}, {y, 0, 2}, AspectRatio → Automatic]
```

Out[54]=



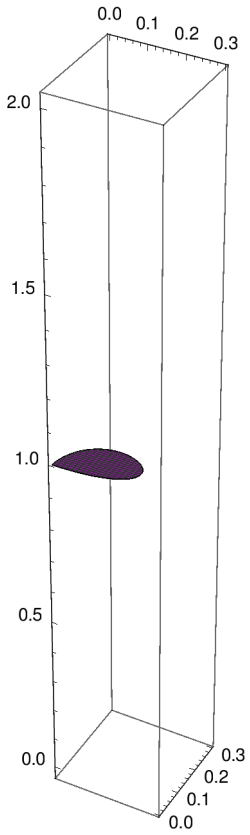
Out[55]=



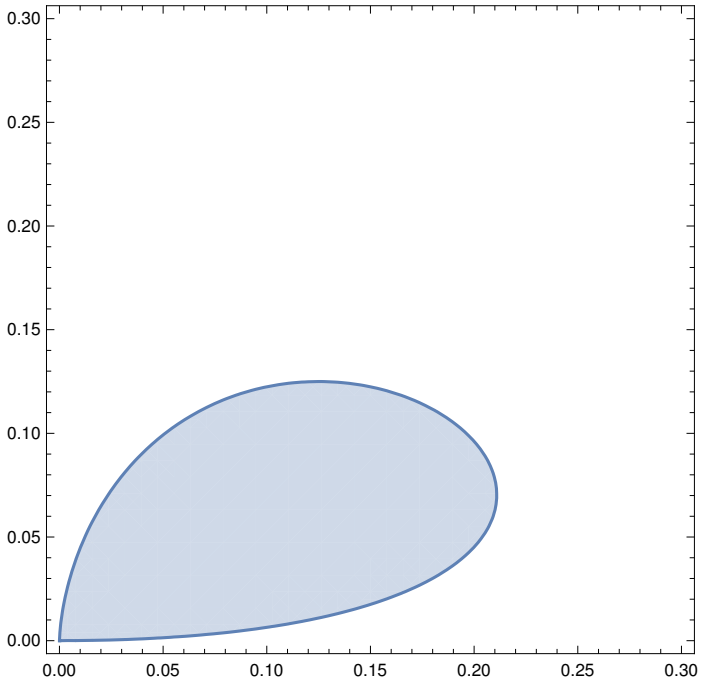
In[62]:=

```
(*6*)
Plot3D[1, {x, 0, 0.3}, {y, 0, 0.3},
 RegionFunction → Function[{x, y, z}, (x + y) ^4 < 2 x^2 y], BoxRatios → Automatic]
RegionPlot[(x + y) ^4 < 2 x^2 y, {x, 0, 0.3}, {y, 0, 0.3}]
```

Out[62]=

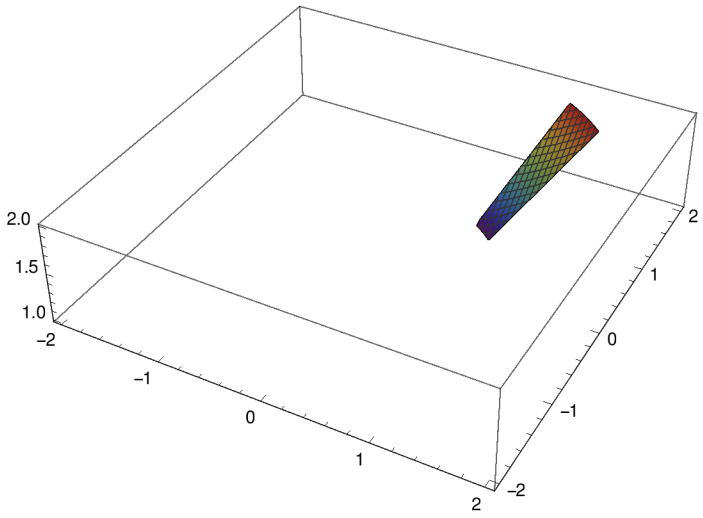

0.0
0.1
0.2
0.3
2.0
1.5
1.0
0.5
0.0
0.3
0.2
0.1
0.0

Out[63]=


0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30

```
(*7*)
Plot3D[{Sqrt[x^2 + y^2]}, {x, -2, 2}, {y, -2, 2}, RegionFunction →
  Function[{x, y, z}, 1 < x^2 + y^2 < 4 && x < y < x * Sqrt[3]], BoxRatios → Automatic]
```

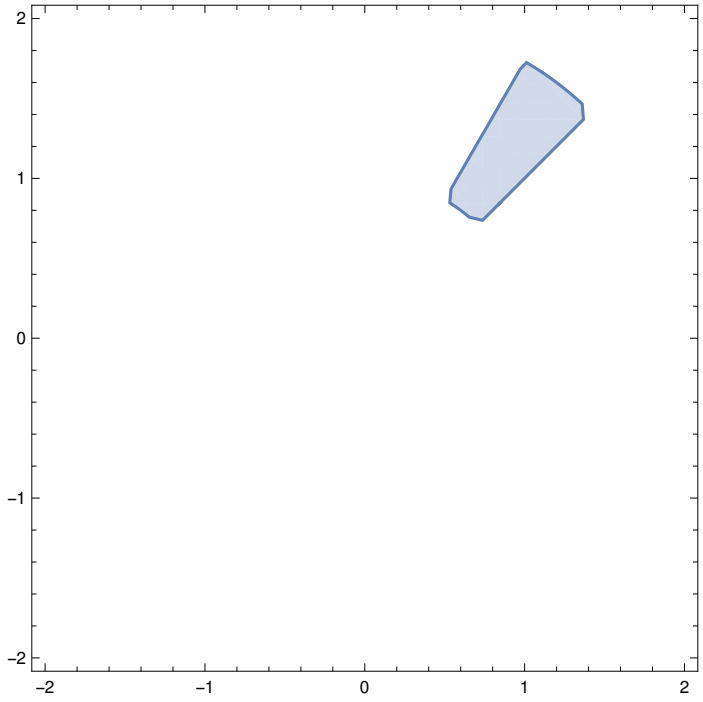
Out[53]=



In[40]:=

```
RegionPlot[1 < x^2 + y^2 < 4 && x < y < x * Sqrt[3], {x, -2, 2}, {y, -2, 2}]
```

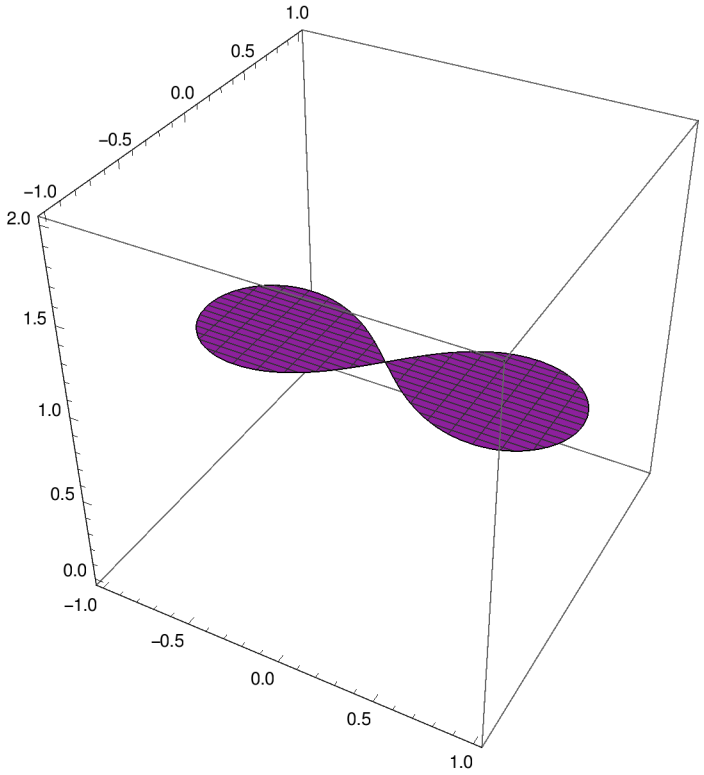
Out[40]=



```
(*8*)
```

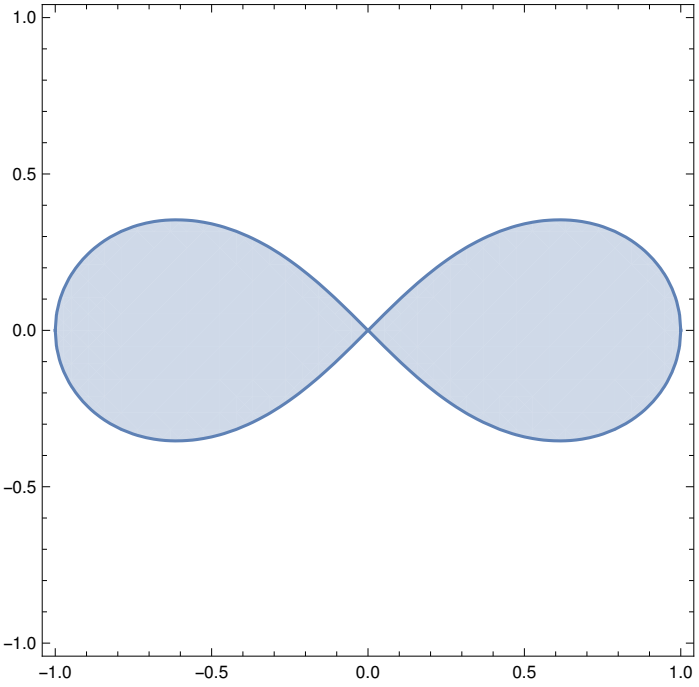
In[67]:=
```
Plot3D[1, {x, -1, 1}, {y, -1, 1},
 RegionFunction → Function[{x, y, z}, (x^2 + y^2)^2 < x^2 - y^2], BoxRatios → Automatic]
```

Out[67]=



In[66]:=
```
RegionPlot[(x^2 + y^2)^2 < x^2 - y^2, {x, -1, 1}, {y, -1, 1}]
```

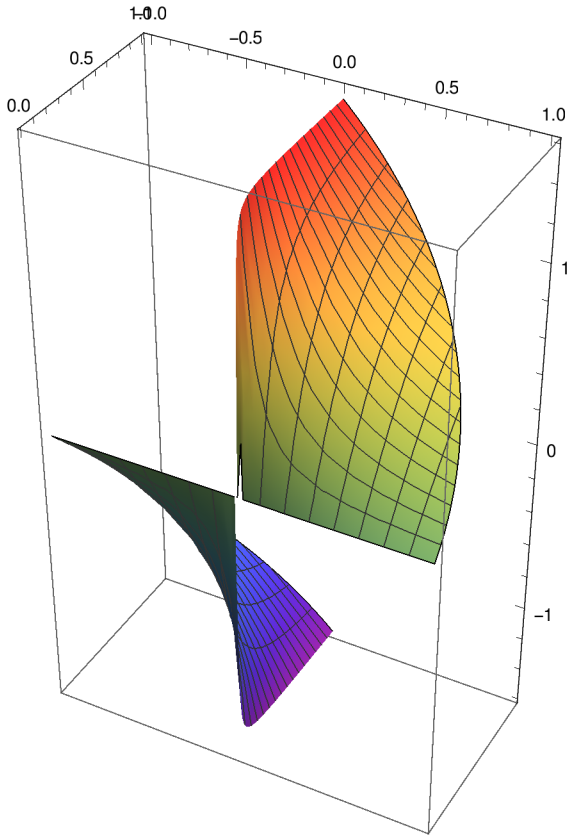
Out[66]=



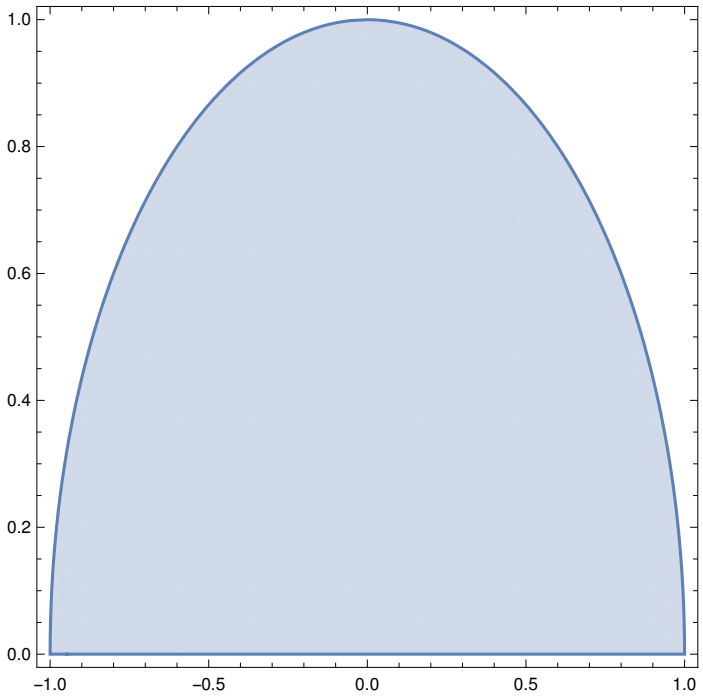

```
(*9*)
```

```
(*10*)
```

```
Plot3D[{ArcTan[y / x]}, {x, -1, 1}, {y, 0, 1},
 RegionFunction → Function[{x, y, z}, x^2 + y^2 < 1], BoxRatios → Automatic]
```

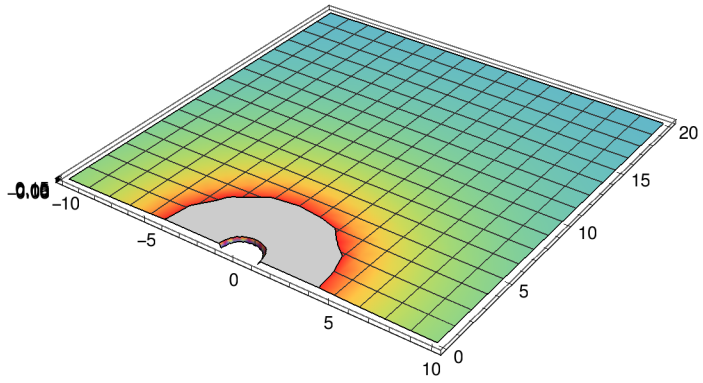


```
RegionPlot[x^2 + y^2 < 1, {x, -1, 1}, {y, 0, 1}]
```

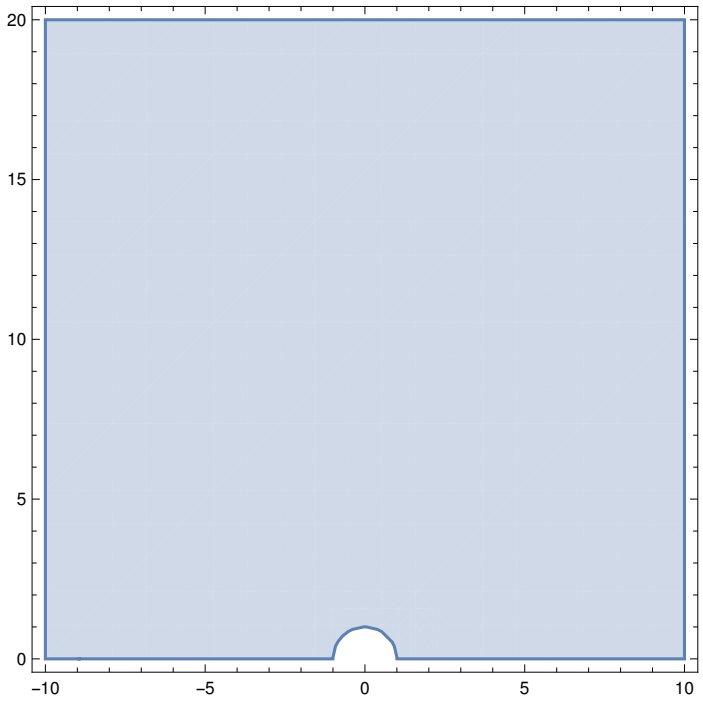



```
(*13*)

Plot3D[{Log[x * x + y * y] / (x * x + y * y)}, {x, -10, 10}, {y, 0, 20},
 RegionFunction → Function[{x, y, z}, x^2 + y^2 > 1], BoxRatios → Automatic]
```

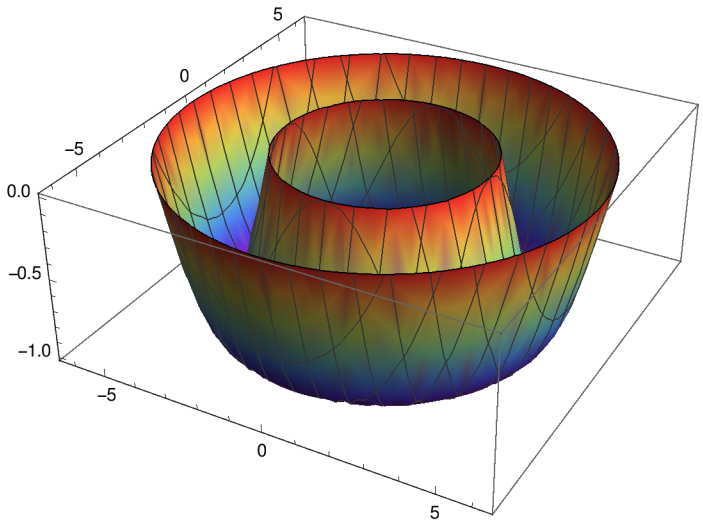


```
RegionPlot[x^2 + y^2 > 1, {x, -10, 10}, {y, 0, 20}]
```




```
(*14*)
```

```
Plot3D[{Sin[Sqrt[x^2 + y^2]]}, {x, -2 Pi, 2 * Pi}, {y, -2 Pi, 2 * Pi},
 RegionFunction → Function[{x, y, z}, Pi^2 < x^2 + y^2 < 4 * Pi^2]]
```



```
RegionPlot[Pi^2 < x^2 + y^2 < 4 * Pi^2, {x, -2 Pi, 2 * Pi}, {y, -2 Pi, 2 * Pi}]
```