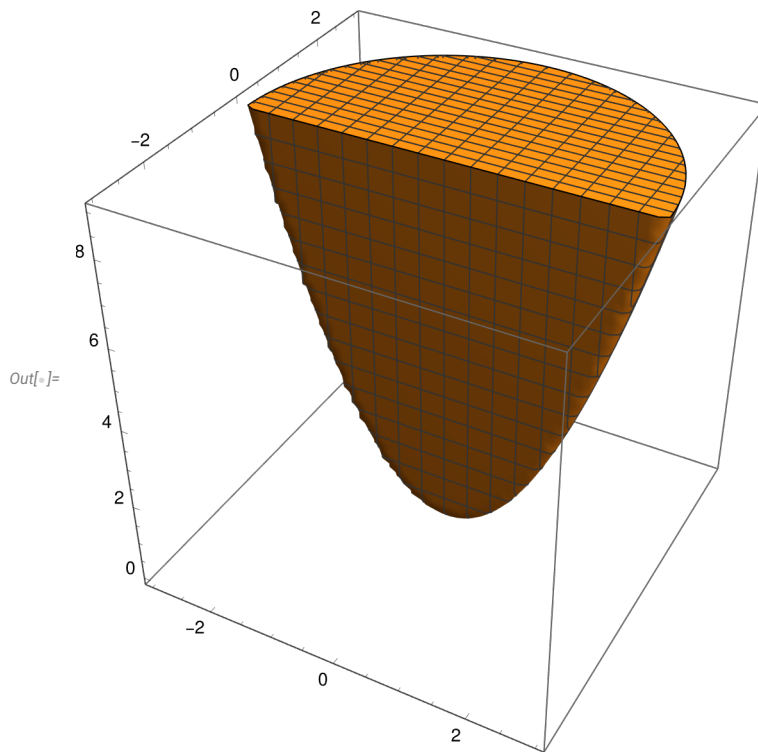


```

In[ ]:= (* We find the centroid of the solid determined by  $z \geq x^2 + y^2$ ,  $z \leq 9$ , and  $y \geq 0$  *)
RegionPlot3D[z ≥ x^2 + y^2 && z ≤ 9 && y ≥ 0, {x, -3, 3}, {y, -3, 3}, {z, 0, 9}, PlotPoints → 50]

```



```

In[4]:= x = r Cos[t]
        y = r Sin[t]
        Jac = Simplify[Det[D[{x, y, z}, {{r, t, z}}]]]

```

Out[4]= $r \cos[t]$

Out[5]= $r \sin[t]$

Out[6]= r

```

In[21]:= a = 9
m = Integrate[Integrate[Integrate[1 Jac , {z, r^2, a}], {t, 0, Pi}], {r, 0, Sqrt[a]}]
mx = Integrate[Integrate[Integrate[x Jac , {z, r^2, a}], {t, 0, Pi}], {r, 0, Sqrt[a]}]
my = Integrate[Integrate[Integrate[y Jac , {z, r^2, a}], {t, 0, Pi}], {r, 0, Sqrt[a]}]
mz = Integrate[Integrate[Integrate[z Jac , {z, r^2, a}], {t, 0, Pi}], {r, 0, Sqrt[a]}]
c = {mx / m, my / m, mz / m}
c // N

Out[21]=
9

Out[22]=

$$\frac{81 \pi}{4}$$


Out[23]=
0

Out[24]=

$$\frac{324}{5}$$


Out[25]=

$$\frac{243 \pi}{2}$$


Out[26]=

$$\left\{0, \frac{16}{5 \pi}, 6\right\}$$


Out[27]=
{0., 1.01859, 6.}

```