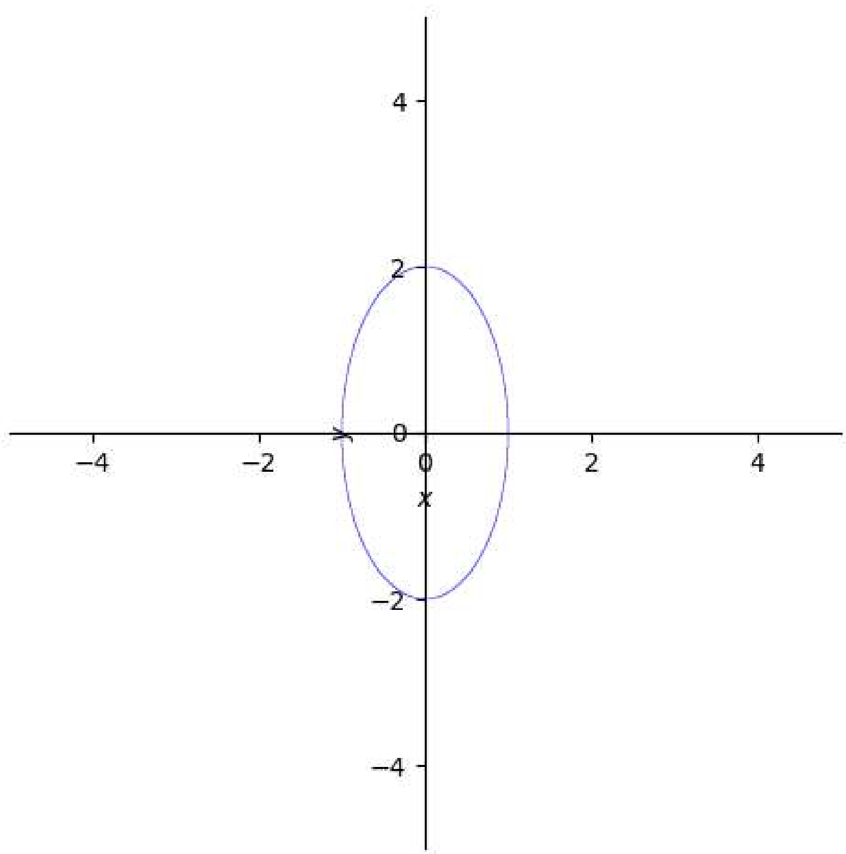
Dubbelintegralen deel2

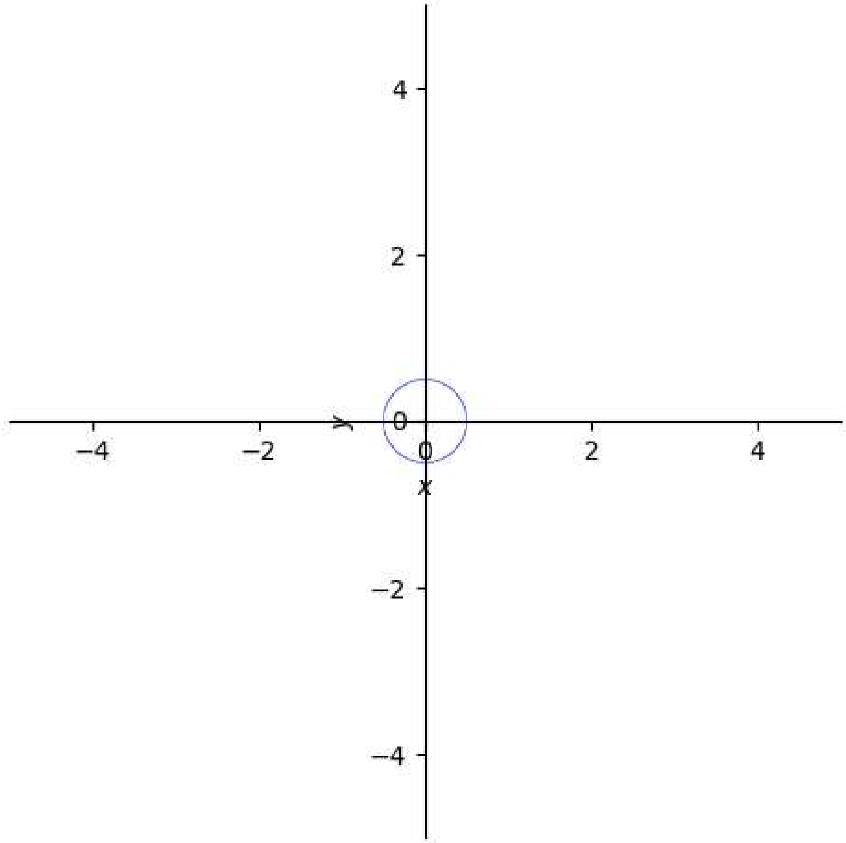
Oefening 2

In [ ]:
```
from sympy import*
import sympy as sp
x, y = sp.symbols('x y')

vglelipsecarth = sp.Eq((x/1)**2+(y/2)**2,1)
vglelipsecarth
vglelipsepolar = vglelipsecarth.subs({x:((r*sp.cos(theta))), y:((r*sp.sin(theta)))}
vglelipsepolar

vglcirkelcarth = sp.Eq((x**2)+y**2,(1/4))
vglcirkelcarth
vglcirkelpolar = vglcirkelcarth.subs({x:((r*sp.cos(theta))), y:((r*sp.sin(theta)))}

p1 = plot_implicit(vglelipsecarth, aspect_ratio=(1,1))
p2 = plot_implicit(vglcirkelcarth, aspect_ratio=(1,1))
p1.extend(p2)

p1.show()
```

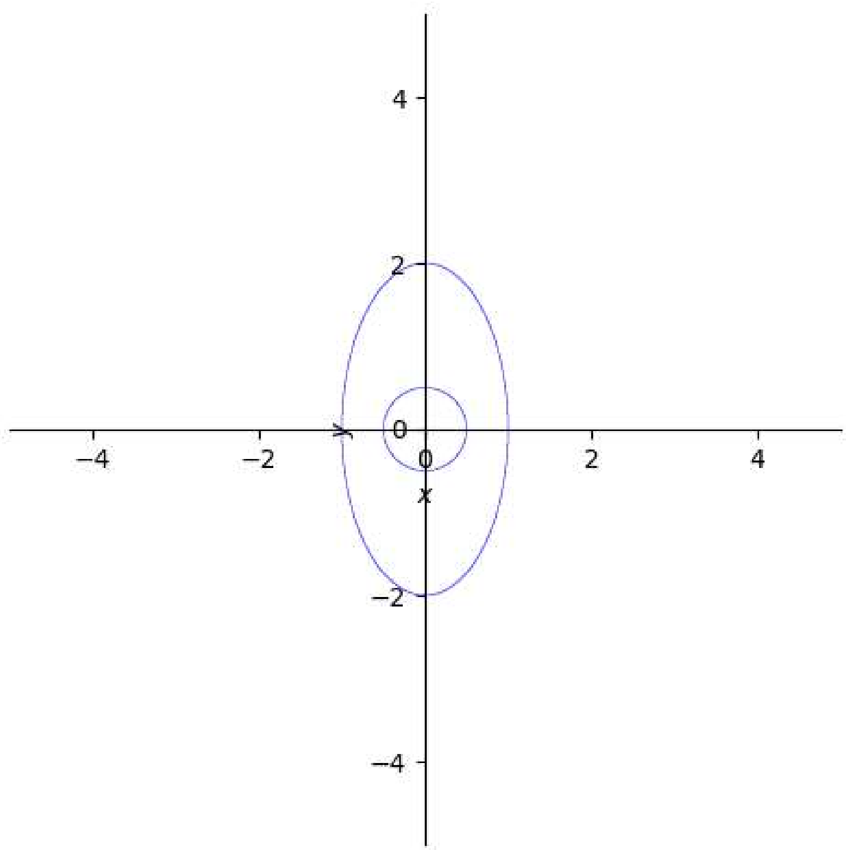
Figure



Figure



Figure



In [ ]:
```
%matplotlib widget
from numpy import*
import numpy as np
from sympy import*
import sympy as sp
from scipy.integrate import dblquad
from sympy.plotting import plot_implicit
x, y, r, theta = sp.symbols('x y r theta')
```

Oppervlakte Ellipse

Poging 1

Fout.

In [ ]:
```
vglelipsecarth = sp.Eq((x/1)**2+(y/2)**2,1)
vglelipsecarth
vglelipsepolar = vglelipsecarth.subs({x:((r*sp.cos(theta))), y:((r*sp.sin(theta)))}
print(vglelipsepolar)

grenzen = sp.solve(vglelipsepolar,r)
print(grenzen)

grenzen2 = simplify(grenzen[1])
print(grenzen2)

integrand = 1*r

# Extract lower and upper limits for r
r_lower = 0  # Lower limit for r is always 0
r_upper = (2*sqrt(-1/(3*sin(theta)**2 - 4)))


# Define the limits for theta
theta_lower = 0
theta_upper = 2 * sp.pi


integraal1 = sp.Integral(integrand,(theta, theta_lower, theta_upper))
integraal1
integraaltot = sp.Integral(integraal1,(r, r_lower, r_upper))
integraaltot
```

```
Eq(r**2*sin(theta)**2/4 + r**2*cos(theta)**2, 1)
[-2*sqrt(-1/(3*sin(theta)**2 - 4)), 2*sqrt(1/(4 - 3*sin(theta)**2))]
2*sqrt(-1/(3*sin(theta)**2 - 4))
```

Out[ ]:

$$\int\limits_{0}^{2\sqrt{-\frac{1}{3\sin^{2}(\theta)-4}}}\int\limits_{0}^{2\pi} r\,d\theta\,dr$$

In [ ]:
```
integraaltot.doit()
```

Out[ ]: $$-\frac{4\pi}{3\sin^2(\theta) - 4}$$

Poging 2

In [ ]:
```
grenzen_ellipse = sp.solve(vglelipsepolar,r)
print(grenzen_ellipse)

grenzen_cirkel = sp.solve(vglcirkelpolar)
grenzen_cirkel

integrand = 1*r

# Extract lower and upper limits for r
r_lower = (1/4)  # Lower limit for r is always 0
r_upper = grenzen_ellipse[1]


# Define the limits for theta
theta_lower = 0
theta_upper = 2 * sp.pi


integraal1 = sp.Integral(integrand,(r, r_lower, r_upper))
integraal1
integraaltot = sp.Integral(integraal1,(theta, theta_lower, theta_upper))
integraaltot
```

```
[-2*sqrt(-1/(3*sin(theta)**2 - 4)), 2*sqrt(1/(4 - 3*sin(theta)**2))]
```

Out[ ]: $$\int\limits_{0}^{2\pi}\int\limits_{0.25}^{2\sqrt{\frac{1}{4-3\sin^2(\theta)}}} r\,dr\,d\theta$$

In [ ]:
```
integraaltot.doit()
```

Out[ ]: 1.9375π

In [ ]: