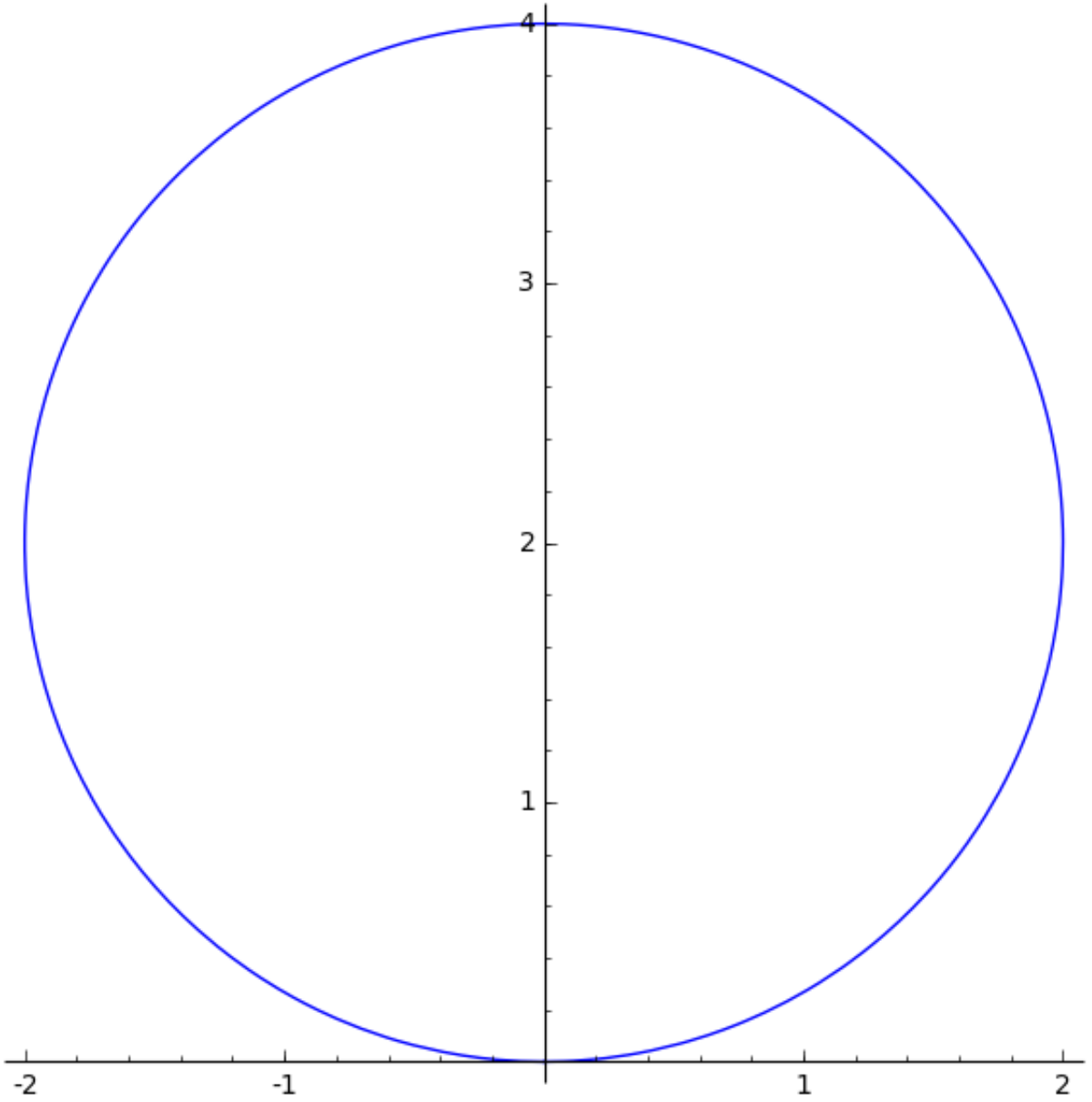
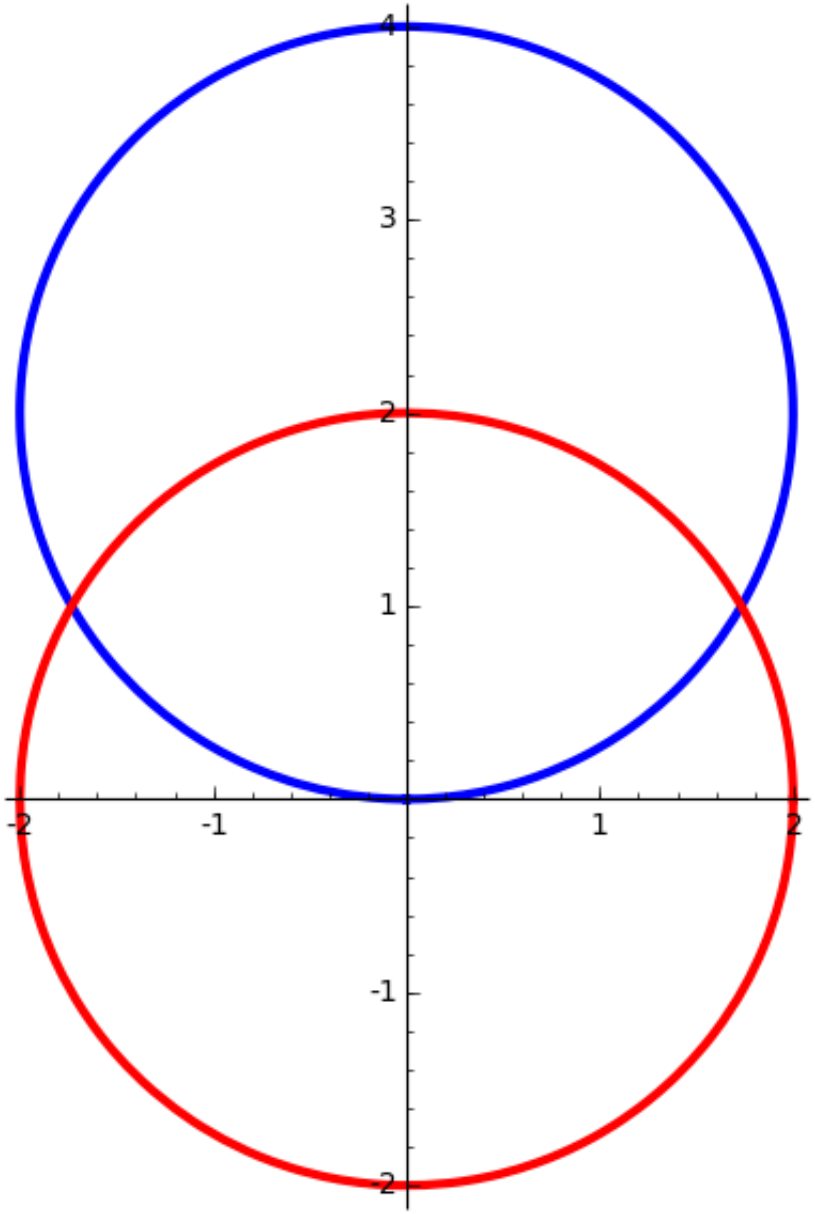
SageSamplesM13

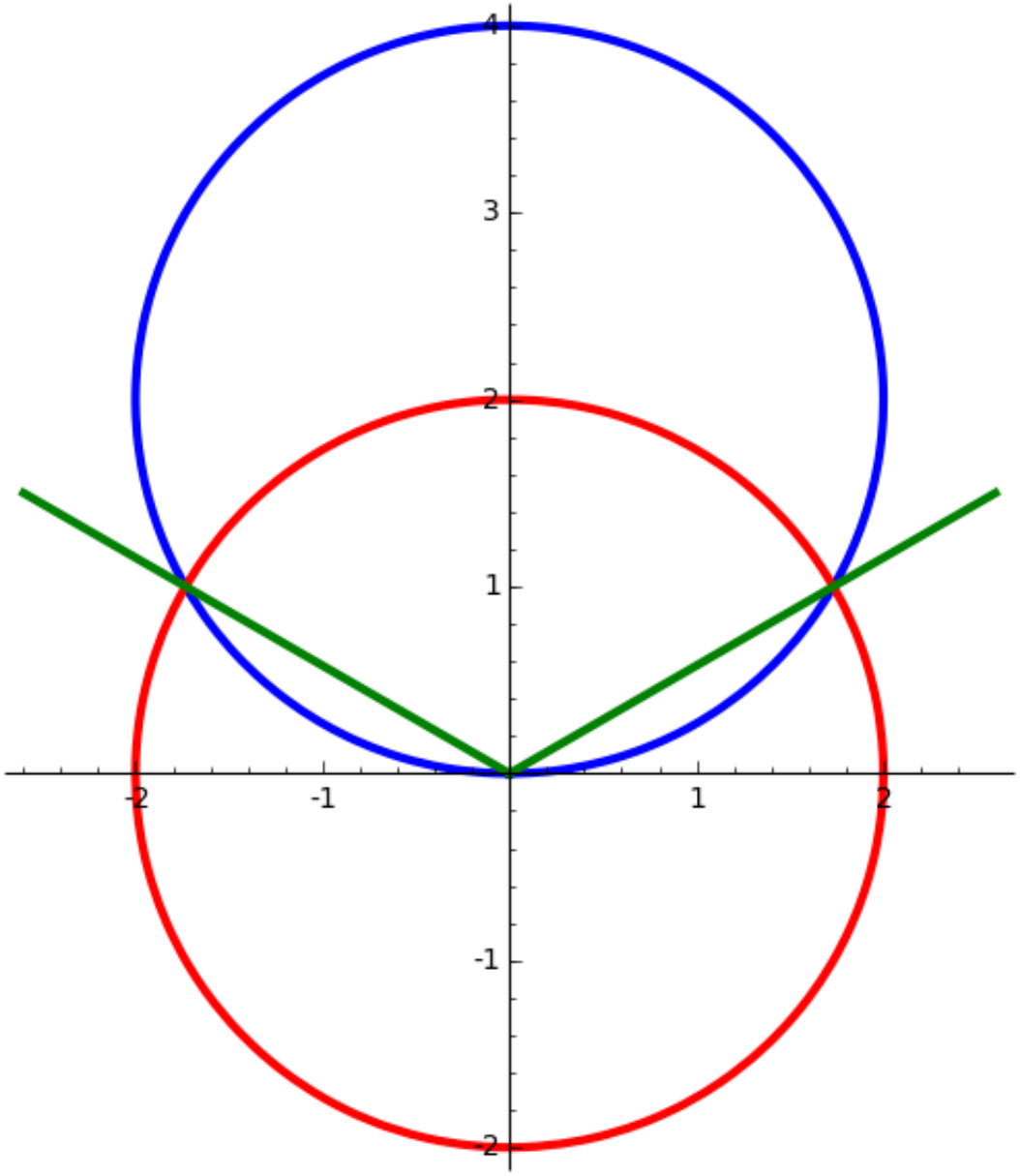
```
var('t')
polar_plot(4*sin(t),(t,0,pi))
```




```
polar_plot(4*sin(t),(t,0,pi), thickness=3)+polar_plot(2,
(t,0,2*pi),thickness=3,color="red")
```




```
polar_plot(4*sin(t),(t,0,pi), thickness=3)+polar_plot(2,
(t,0,2*pi),thickness=3,color="red")+line([(0,0),(1.5*sqrt(3),1.5)], thickness = 3,
color="green")+line([(0,0),(-1.5*sqrt(3),1.5)], thickness = 3, color="green")
```



The Mass

```
var('r t');
integral(integral(r*cos(t)^2,(r,2,4*sin(t))),(t,pi/6,5*pi/6))
```

```
1/4*(3*sqrt(3))
```

```
M=integral(integral(r*cos(t)^2,(r,2,4*sin(t))),(t,pi/6,5*pi/6))
```

```
M
```

```
1/4*(3*sqrt(3))
```

The x-moment, M_x

```
Mx=integral(integral(r^2*sin(t)*cos(t)^2,(r,2,4*sin(t))),(t,pi/6,5*pi/6))
Mx
```

```
8/9*pi + 1/18*(3*sqrt(3)) + 1/6*sqrt(3) - 1/3*sqrt(3)
```

```
Mx.simplify()
```

```
8/9*pi
```

```
y_bar = Mx/M
y_bar.simplify()
```

```
32/81*sqrt(3)*pi
```

```
y_bar.simplify().n()
```

```
2.14968813538870
```

Check the y-moment, M_y

```
My=integral(integral(r^2*cos(t)*cos(t)^2,(r,2,4*sin(t))),(t,pi/6,5*pi/6))
My
```

```
0
```