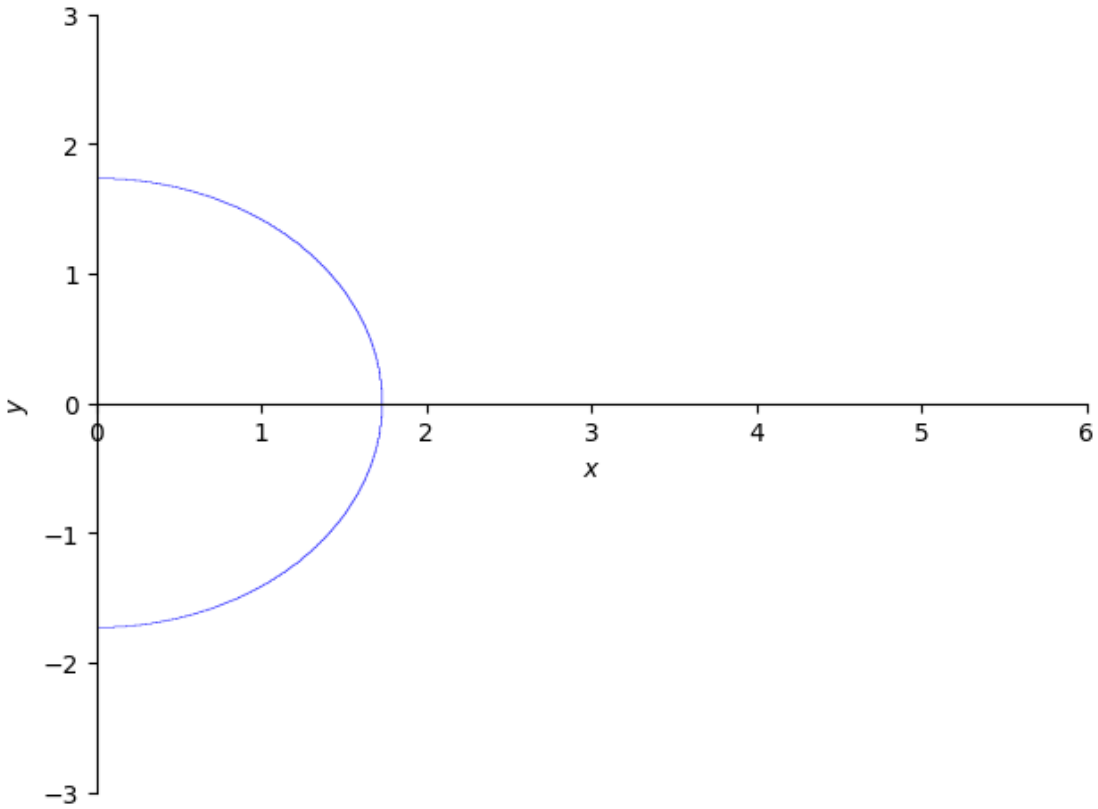
ellipse

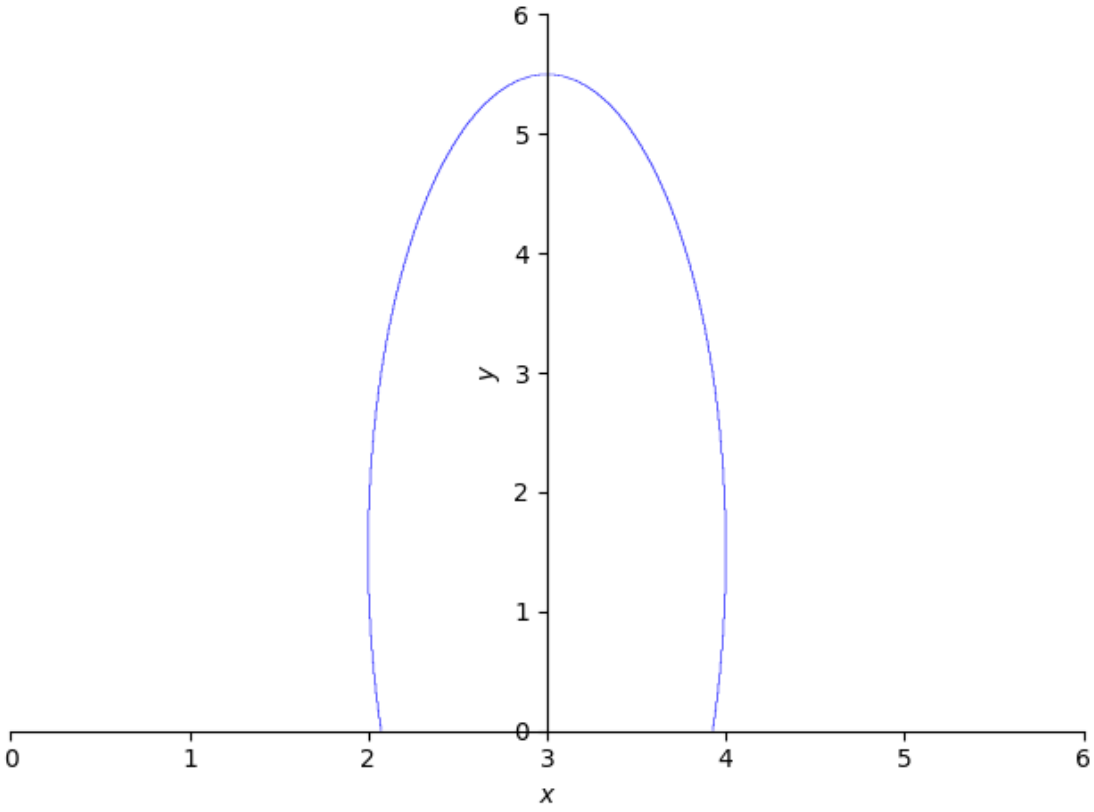
December 3, 2022

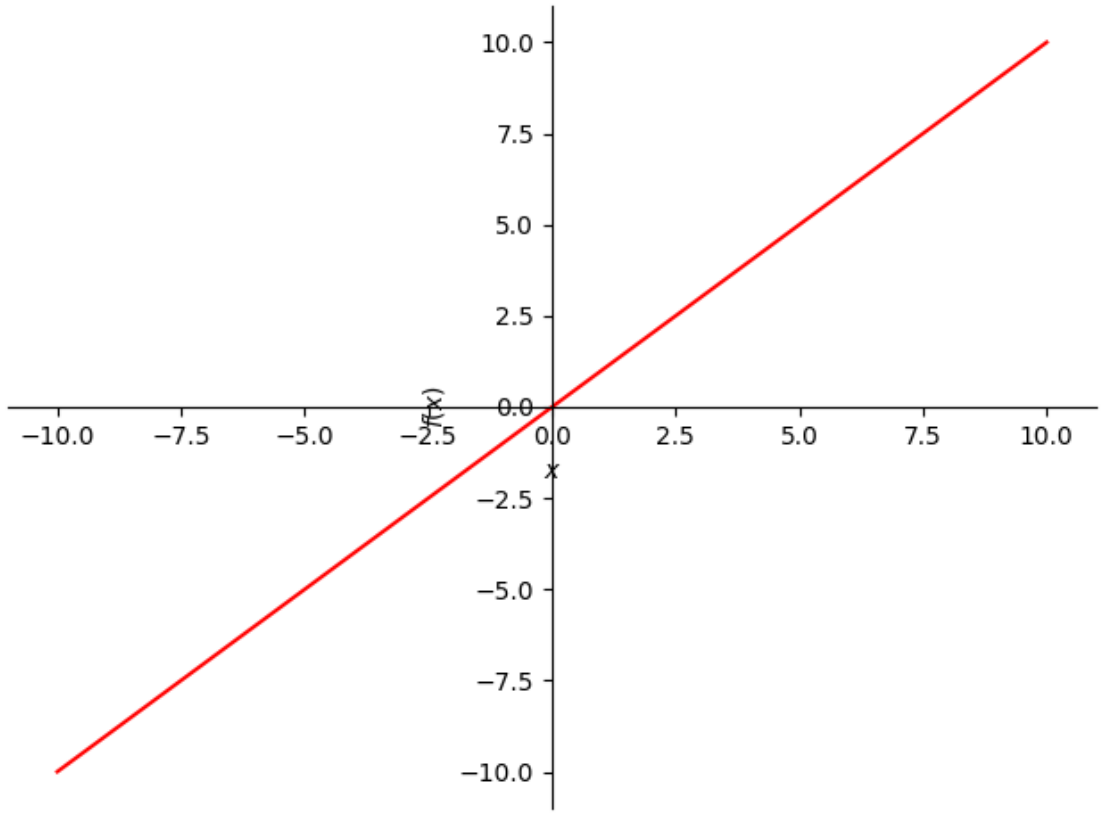
[ ]:
```
from sympy import *

x,y = symbols('x y')

p2 = plot_implicit(
    Eq(x**2 + y**2, 3), (x, 0, 6), (y, -3, 3))
```



[ ]:
```
from sympy import *
from sympy.plotting import plot as symplot

x,y,a1,b1,x0,y0 = symbols('x y a b h k')
```

```
a1 = 1
b1=4
x0=3
y0=1.5

p1 = plot_implicit(
    Eq(((x-x0)**2)/a1**2 + ((y-y0)**2)/b1**2, 1), (x, 0, 6), (y, 0, 6))

line = a1*x+0
p=p1.extend(symplot(line,line_color='r'))
p.show()
```

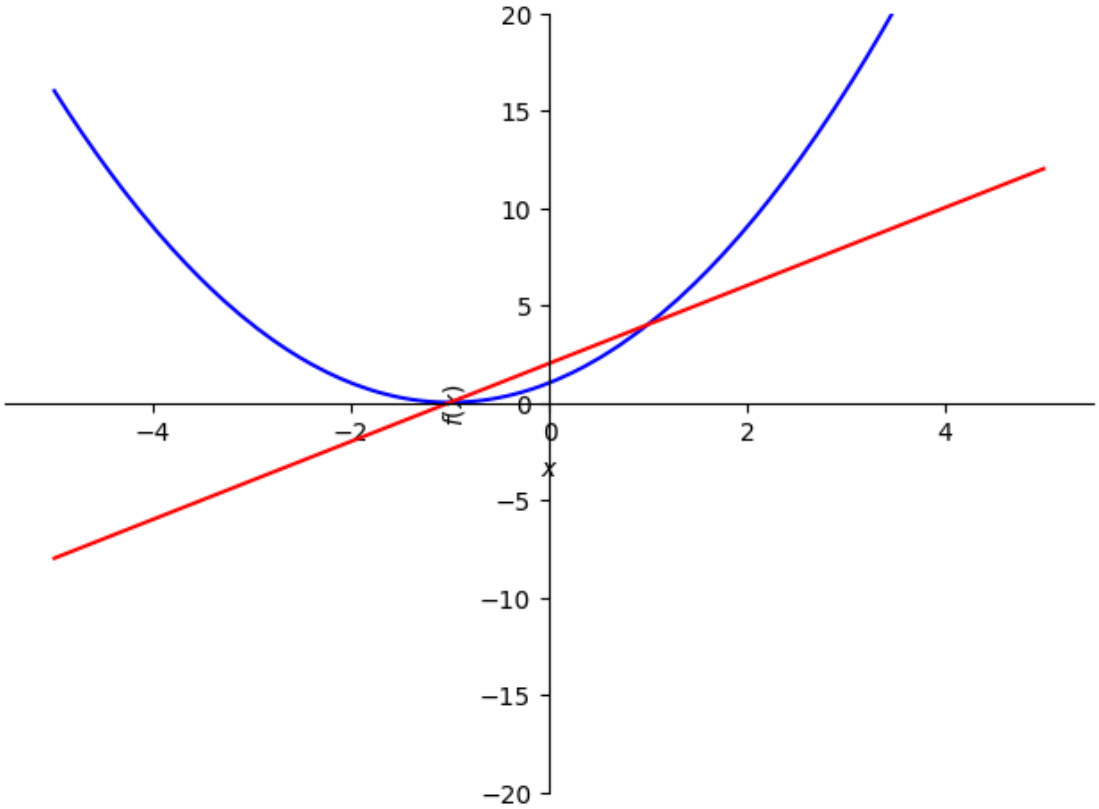





```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[24], line 16
     14 line = a*x+0
     15 p=p1.extend(symplot(line,line_color='r'))
---> 16 p.show()

AttributeError: 'NoneType' object has no attribute 'show'
```

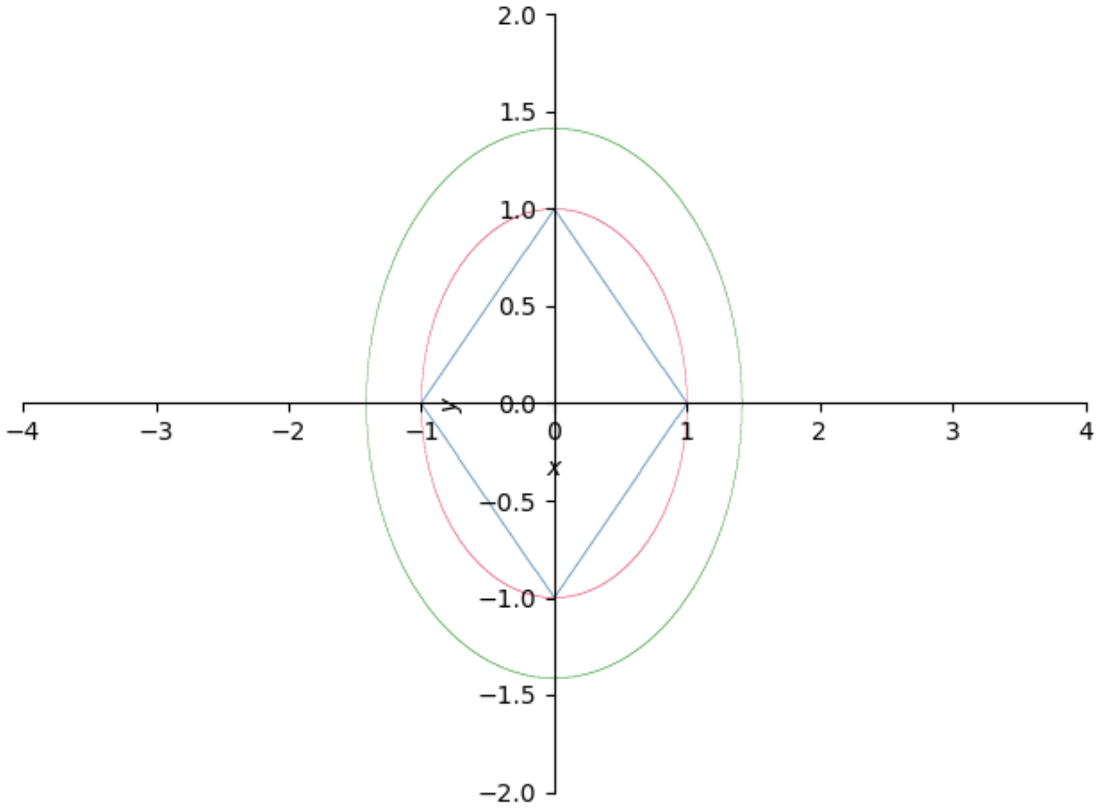
[ ]:
```python
def f1(a, b, c, d):
    y = a*x**3 + b*x**2 + x*c + d
    return y
    ###yprime = y.diff(x)
    ###return yprime

def derivative(a, b, c, d):
    y = a*x**3 + b*x**2 + x*c + d
    yprime = y.diff(x)
    return yprime
```

```
y = f1(0,1,2,1)
yp = derivative(0,1,2,1)


p = plot(y, (x, -5, 5), ylim=(-20, 20), line_color='b', show=False)
p.extend(plot(yp, (x, -5, 5), ylim=(-20, 20), line_color='r', show=False))
p.show()
```



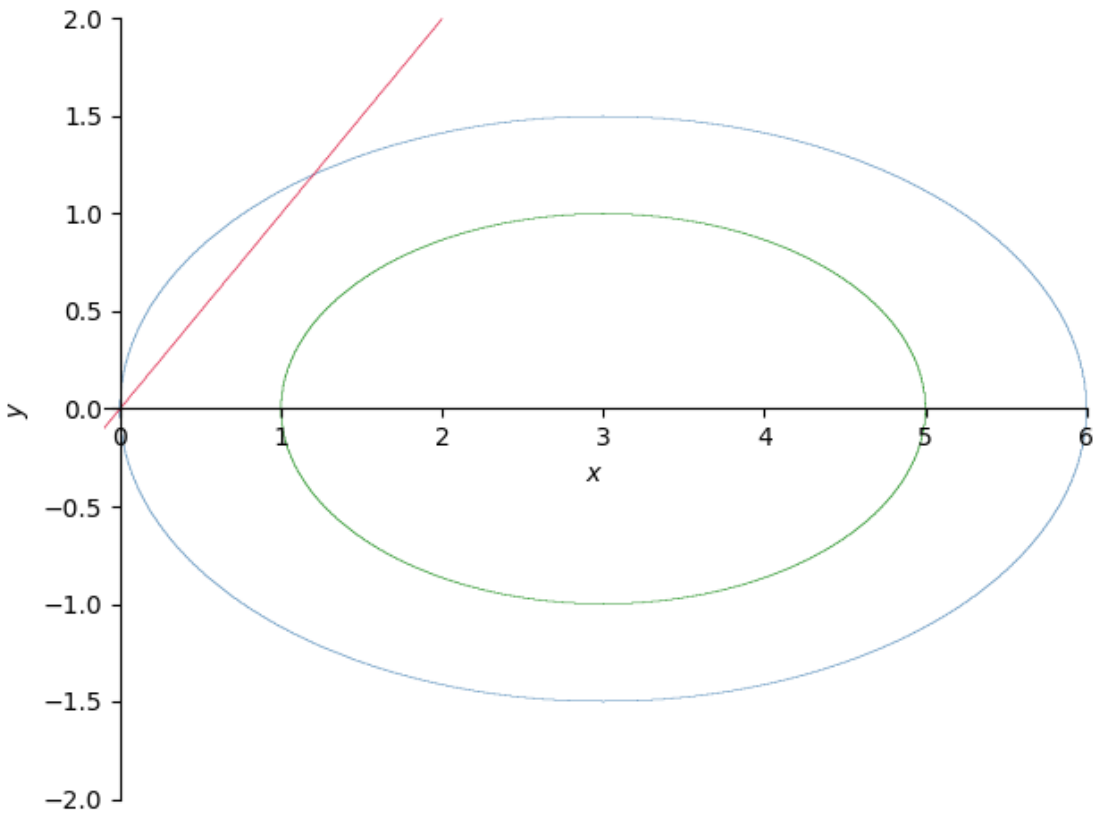
[ ]:
```
from sympy import symbols, plot_implicit, Eq, Abs

x, y = symbols('x y')
plot1 = plot_implicit(Eq(Abs(x) + Abs(y), 1), (x, -4, 4), (y, -2, 2),
                      line_color='steelblue', show=False)
plot2 = plot_implicit(Eq(x ** 2 + y ** 2, 1), (x, -2, 2), (y, -2, 2),
                      line_color='crimson', show=False)
plot3 = plot_implicit(Eq(x ** 2 + y ** 2, 2), (x, -2, 2), (y, -2, 2),
                      line_color='green', show=False)

# Append to show in same graph
plot1.append(plot2[0])
plot1.append(plot3[0])
```

```
plot1.show()
```



[ ]:
```
from sympy import symbols, plot_implicit, Eq, Abs, solve

x, y = symbols('x y')

# Center of the ellipse
x0=3
y0=0

# Ellipse 1
a1=3
b1=1.5
ellipse1 = Eq(((x-x0)**2)/a1**2 + ((y-y0)**2)/b1**2, 1)

# Ellipse 2
a2=2
b2=1
ellipse2 = Eq(((x-x0)**2)/a2**2 + ((y-y0)**2)/b2**2, 1)

# Line
```

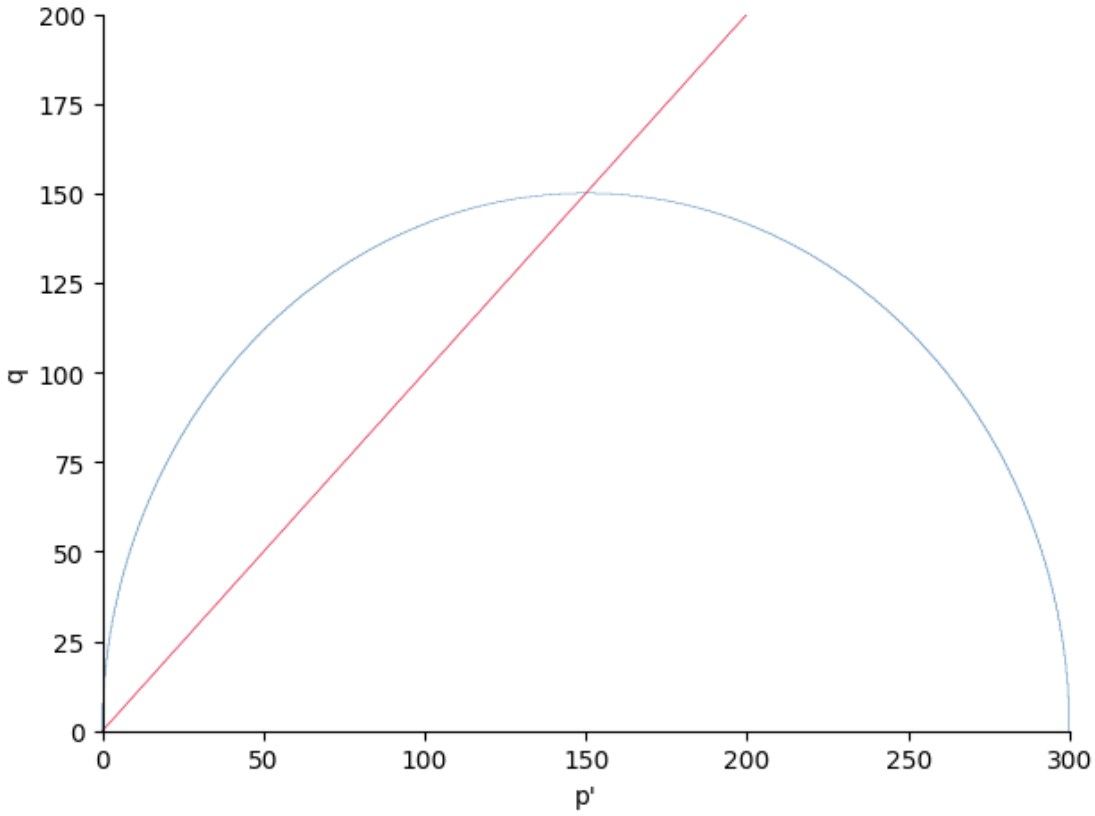
```
x_slope = 1
line=Eq(x * x_slope + 0,y)



plot1 = plot_implicit(ellipse1, (x, -0.1, 6), (y, -2, 2),
                      line_color='steelblue', show=False)
plot2 = plot_implicit(line, (x, -0.1, 6), (y, -2, 2),
                      line_color='crimson', show=False)
plot3 = plot_implicit(ellipse2, (x, -0.1, 6), (y, -2, 2),
                      line_color='green', show=False)


# Append to show in same graph
plot1.append(plot2[0])
plot1.append(plot3[0])
plot1.show()


# Find crossing points between line and ellipse1
crossing_point = [ellipse1,line]
answer = solve(crossing_point,(x,y))
print(f"Crossing point with line and ellipse1 {answer}")

# Find crossing points between line and ellipse1
crossing_point = [ellipse2,line]
answer = solve(crossing_point,(x,y))
print(f"Crossing point with line and ellipse2 {answer}")
```




```
Crossing point with line and ellipse1 [(0.0, 0.0), (1.20000000000000,
1.20000000000000)]
Crossing point with line and ellipse2 [(3/5 - 4*I/5, 3/5 - 4*I/5), (3/5 + 4*I/5,
3/5 + 4*I/5)]
```

[ ]:
```python
from sympy import symbols, plot_implicit, Eq, Abs, solve

x, y = symbols('x y')

# Center of the ellipse
x0=150
y0=0

# Ellipse 1
a1=150
b1=150
ellipse1 = Eq(((x-x0)**2)/a1**2 + ((y-y0)**2)/b1**2, 1)

# # Ellipse 2
# a2=2
# b2=1
```

```
# ellipse2 = Eq(((x-x0)**2)/a2**2 + ((y-y0)**2)/b2**2, 1)

# Line
x_slope = 1
line=Eq(x * x_slope + 0,y)



plot1 = plot_implicit(ellipse1, (x, -0.1, 300), (y, -0.1,␣
 ↪200),xlabel="p'",ylabel='q',
                      line_color='steelblue', show=False)
plot2 = plot_implicit(line, (x, -0.1, 300), (y, -0.1, 200),
                      line_color='crimson', show=False)
# plot3 = plot_implicit(ellipse2, (x, -0.1, 6), (y, -2, 2),
#                       line_color='green', show=False)


# Append to show in same graph
plot1.append(plot2[0])
#plot1.append(plot3[0])
plot1.show()


# Find crossing points between line and ellipse1
crossing_point = [ellipse1,line]
answer = solve(crossing_point,(x,y))
print(f"Crossing point with line and ellipse1 {answer}")

# # Find crossing points between line and ellipse1
# crossing_point = [ellipse2,line]
# answer = solve(crossing_point,(x,y))
# print(f"Crossing point with line and ellipse2 {answer}")
```




```
Crossing point with line and ellipse1 [(0, 0), (150, 150)]
```

[ ]: