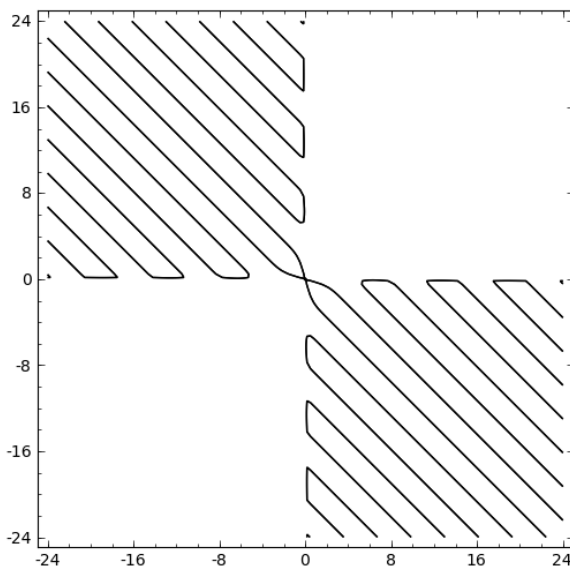


MA123F – Some implicit plots

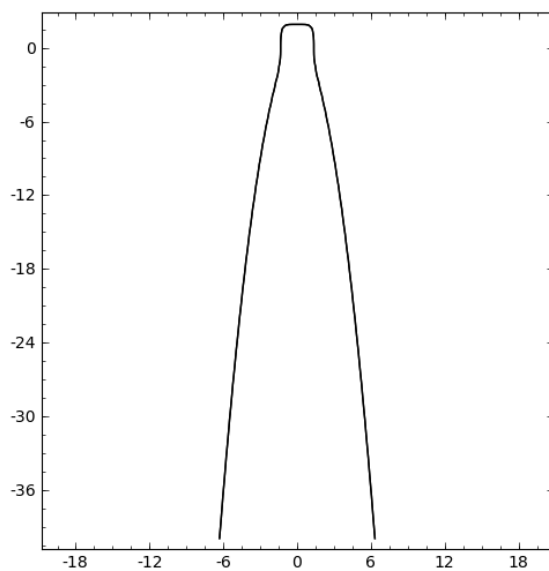
Fall 2010

Below are plots of the examples we considered in class in the section on implicit differentiation.

- (1) Plot of the points (x, y) satisfying $e^{xy} = \cos(x + y)$.



- (2) Plot of the points (x, y) satisfying $x^6 + y^3 = 7$.



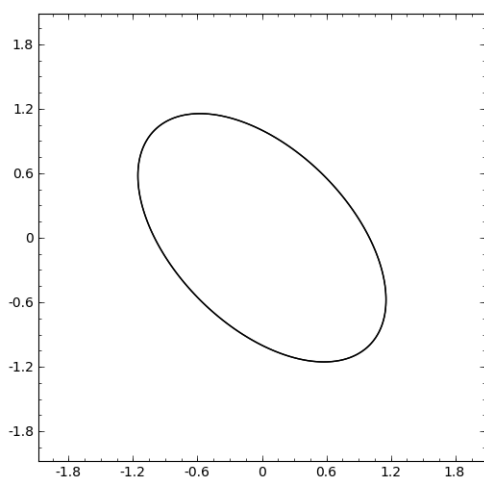
(3) Plot of the points (x, y) satisfying $x^2 + xy + y^2 = 1$. This is an ellipse. Writing it as

$$\left(\frac{x+y}{2/\sqrt{3}}\right)^2 + \left(\frac{x-y}{2}\right)^2 = 1$$

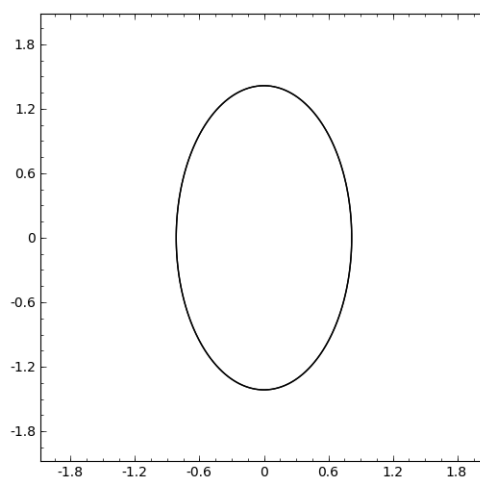
makes it apparent that its major axis is the line $x + y = 0$ and its minor axis is the line $x - y = 0$. It is the ellipse

$$\left(\frac{x}{\sqrt{2}/\sqrt{3}}\right)^2 + \left(\frac{y}{\sqrt{2}}\right)^2 = 1$$

rotated by 45° .



$$x^2 + xy + y^2 = 1$$



$$\left(\frac{x}{\sqrt{2}/\sqrt{3}}\right)^2 + \left(\frac{y}{\sqrt{2}}\right)^2 = 1$$

These plots were made with the `implicit_plot` function in Sage. Sage is a free, open-source mathematics software available for download at www.sagemath.org.