ASSIGNMENT 6   **MATHEMATICS 1000**   FALL 2023

Due: Monday, November 6th, 2023 at 4:00pm. SHOW ALL WORK.

Note: You should complete the WebAssign problem sets "The Chain Rule", "Derivatives of Exponential Functions" and "Implicit Differentiation" as well as Worksheets 3.2 and 3.3, before you work on this assignment.

1. Differentiate each of the following functions.

   (a) $f(x) = \csc(\sin^5(x))$

   (b) $y = (x^2 + 1)^6 (2x - 3)^9$

   (c) $f(x) = \tan(x^3 3^x)$

   (d) $y = 10^{\cos(e^{7x})}$

2. The curve defined by the equation

$$(x^2 + y^2)^2 = x^3 - 3xy^2$$

   is known as a *trifolium* or *three-petalled rose*. (Its graph is shown below.) Find the equation of the tangent line at the point $\left(-\frac{1}{2}, -\frac{1}{2}\right)$.
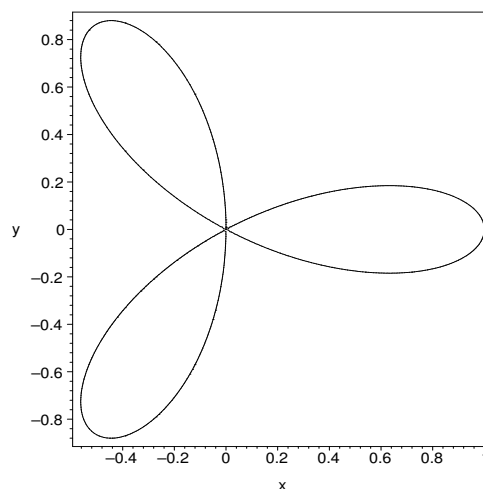

Figure 1: The graph of the equation $(x^2 + y^2)^2 = x^3 - 3xy^2$.