MATH 261, Spring 2001 **Due Date:**_____ **Name(s):** _____

Extra Project 15.2b: A Strange Function

Objective

If you have not already done so, read Section 15.2 of the text. In this project we investigate a function that exhibits some very strange behavior.

Narrative

While Maple can help understand what the graph of a function $f(x, y)$ looks like, it is not without flaw. There are *some* functions which it will inevitably have difficulty graphing. In this project we consider one such function.

Task

1. Explain why Maple might have difficulty correctly drawing the graph of $f(x, y) = (x^2 - y^2)/(x^2 + y^2)$ over a square such as $[-1, 1] \times [-1, 1]$. (*Hint*: Consider what would happen if Maple were to try to draw the graph by plotting just points. What would happen if y was fixed at 0, and you approached the origin along the x-axis? What would happen if x was fixed at 0, and you approached the origin along the y-axis?)
2. Describe what the graph of $f(x, y) = (x^2 - y^2)/(x^2 + y^2)$ looks like near the origin.