

Matlab 2– due April 1, 2005

Math 241H

You are encouraged to work on these problems in groups of two or three. Each group should turn in only one copy of the assignment, but put all your names on the assignment you turn in. Your assignment should include a printout of your Matlab session (i.e., the Matlab commands you gave and the Matlab's responses) as well as your graphic output.

Problem 1. Let $f(x, y) = 1 - 3x^2 + 4y^2$.

(a) Use Matlab to graph $z = f(x, y)$ near $(0, 0)$. Use both mesh and contour to examine the behavior of f near $(0, 0)$.

(b) Based on your graphs, does $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exist? Explain.

(c) Based on your graphs, does $z = f(x, y)$ have a tangent plane at $(0, 0)$. Explain.

Problem 2. Let $h(x, y) = \frac{2x^2 - y^2}{3x^2 + y^2}$.

(a) Use Matlab to graph $z = h(x, y)$ near $(0, 0)$. Use both mesh and contour to examine the behavior of h near $(0, 0)$.

(b) Based on your graphs, does $\lim_{(x,y) \rightarrow (0,0)} h(x, y)$ exist? Explain.

(c) Based on your graphs, does $z = h(x, y)$ have a tangent plane at $(0, 0)$. Explain.

Problem 3. Use mesh and contour to examine the behavior of the following three functions near $(0, 0)$. In each case, find the discriminant $D(0, 0)$ and discuss whether the 2nd partials test is violated. You may work these calculations of $D(0, 0)$ out by hand: write them out along with your discussion and attach the separate sheet.)

(a) $x^4 + y^4$.

(b) $y^4 - x^4$.

(c) $x^5 + x^3 + y^3$. Is $(0, 0)$ a saddle point in this case?