

Name: _____

Maple Assignment 1

1. Consider the function $f(x, y) = 3x^2y - 4xy^2 + (2x + 3y)^2$
 - a) Find f_x
 - b) Find $\frac{\partial^2 f}{\partial y^2}$
 - c) Find ∇f

2. If $f(x, y) = 3x^2y^3 - 2xy$ and $x = \cos(t)$ and $y = \sin(t)$, then find $\frac{\partial f}{\partial t}$ for $t = 0$

3. Suppose $f(x, y) = (x^2 + y^2)e^{-x^2} + xy \ln(1 + y^2)$
 - a) Find the directional derivative $D_v(f)$ at $P(1,1)$ in the direction $v = \langle 3, 4 \rangle$
 - b) If you are standing at $P(1,1)$, in which direction would the function increase the most?
 - c) What is the steepest increase of $f(x, y)$ at $P(1,1)$?

4. Find all local max, min, and saddle points, if any, for $f(x, y) = x^2 + 4y^2 + 8xy + 18x^3$. You might want to use Maple to solve the system of equations leading to the critical points.

5. Use Maple's "plot3d" and "contourplot" command to plot the graph of the functions in (1), (3), and (4). For (4), choose plot boundaries carefully so that the special point(s) are visible in the contour plot and label them. Hint: there are two!