

Math 350 Problem Set 3 (Part II) (due Friday 9/24 by 3pm)

1. Compute the second order Taylor approximation to $f(x, y) = x^3y + x^2y$ at
 - (a) (3pts) $(x_0, y_0) = (0, 0)$. What is $R_2((0, 0), (x, y))$?
 - (b) (3pts) $(x_0, y_0) = (1, 1)$.
2. Find the critical points of the following functions and determine whether they are maxima, minima or saddle points.
 - (a) (4pts) $f(x, y) = x^2 + y^2 - xy$
 - (b) (4pts) $f(x, y) = (x - y)(xy - 1)$.
 - (c) (4pts) $f(x, y, z) = x^2 + y^2 - z^2$
3. (6pts) Find all local and global maxima and minima in the region $x^2 + y^2 \leq 4$ of the function
$$f(x, y) = (x^2 + y^2)^2 - 2(x^2 + y^2) + 1$$
4. (6pts) Show that the rectangular parallelepiped (3 dimensional box with 3 pairs of parallel, rectangular sides) with fixed surface area and maximum volume is a cube.