

Math 13 Fall 2009 Homework 4. Due Friday October 23 11:15am

1.) (1 point) Is it possible to have a continuous differentiable function  $f : \mathbb{R} \rightarrow \mathbb{R}$  with two different local maxima and no local minimum? Explain your reasoning in full sentences. You are not required to write a formal proof, but a well written 2-3 sentence explanation of your thought process is mandatory.

2.) (5 points) Find all local maxima, local minima and saddle points of the function  $g : \mathbb{R}^2 \rightarrow \mathbb{R}$  given by

$$g(x, y) = -2x^4 + 4x^2 - y^2.$$

Compare your findings to your explanation from problem 1. Use the following link

<http://ocw.mit.edu/ans7870/18/18.02/f07/tools/FunctionsTwoVariables.html>

to plot and print a graph of the function on an appropriate domain which will illustrate clearly all maxima and minima of  $g$ . Write 2-3 sentences explaining what is different when dealing with functions of 2 variables as opposed to functions of 1 variable.

3.) (4 points) Find the volume of the solid bounded by  $z = 2 + x^2 + x(y - 2)^2$ ,  $x = y$ ,  $x = 1$ ,  $y = 3$  and  $z = -1$ .