

## Math 253A - Accelerated Calculus III

Homework sheet 7

Due 03/06/2018

**To read:** Section 13.6, 13.7 and 13.8 in the book.

### Problem 1

Find all the local maxima, local minima and saddle points of the following functions:

a)  $f(x, y) = 3y^2 - 2y^3 - 3x^2 + 6xy$ .

b)  $f(x, y) = 8x^3 + y^3 + 6xy$ .

### Problem 2

Find the absolute maxima and minima of the function

$$f(x, y) = x^2 + xy + y^2 - 6x$$

on the rectangular domain  $0 \leq x \leq 5$ ,  $-3 \leq y \leq 3$ .

### Problem 3

On the sphere  $x^2 + y^2 + z^2 = 25$ , find the points  $(x, y, z)$  for which the function

$$f(x, y, z) = x + 2y + 3z$$

gets maximal and minimal? Use a Lagrange multiplier to solve this problem.

### Problem 4

A consumer has 600 to spend on two commodities, the first of which costs 20 per unit and the second 30 per unit. Suppose that the utility derived by the consumer from  $x$  units of the first commodity and  $y$  units of the second commodity is given by the Cobb-Douglas utility function  $f(x, y) = 10x^{0.6}y^{0.4}$ . How many units of each commodity should the consumer buy to maximize the utility  $f$ ?