Mathematical analysis II — Tutorial 11

http://kam.mff.cuni.cz/~tereza/teaching.html

Problem 1: Find points such that on their open neighborhood can the curve $x^2 - xy + y^2 = 3$ be described as a graph of some function $y = f(x)$. Find minimal and maximal values of x and y of points on the curve.

Problem 2: Find global extrema:

a) $f(x, y) = 5x - 3y$, on the set $M_1 = \{(x, y)|x^2 + y^2 = 136\}$.

b) $f(x, y, z) = x$ on the set $M_2 = \{(x, y, z)|x^2 + y^2 + z^2 \leq 1, x^3 + y^3 + z^3 = 0\}$.

Problem 3: What is the largest volume a box without a lid made out of 12 m^2 of plywood can have? What would be the dimensions of the box?

Mathematical analysis II — Homework 11

Due: 9:00, 22.5.2019

Write your solution of each problem on a separate sheet of paper of format A4, without torn edges. One part will be marked for credit.

Problem 1: Find local and global extrema of $f(x, y) = 2x^2 - y^2 + 6y$ on the set $M = \{(x, y)|x^2 + y^2 \leq 16\}$.

Problem 2: Asteroid is the curve satisfying $x^{2/3} + y^{2/3} = 1$. Find points (x_0, y_0), in which this curve is a graph of a function $y = f(x)$ and $f'(x_0) = -1$.

Problem 3: Using the method of Lagrange multipliers, find the point on the line of intersection of the planes $3x - 2y + 4z = 9$ and $x + 2y = 3$ which is closest to the point $(3, -1, 2)$. Hint: minimize square of the distance, not the distance itself.