Home Assignment 2 - Multivariable calculus, 2008.

Deadline: 07.10.2008.

1. Calculate the maximum and minimum values of the function $f(x,y) = (x+y)\,e^{-x^2-2y^2}$,

   where $D_f = \{(x,y)\,\epsilon\,\mathbb{R}^2 \mid x^2+2y^2 \leq 1\,\}$. *(1/4 p)*

2. (a) Calculate the maximum and minimum values of the function $f(x,y) = \dfrac{x-y}{1+x^2+y^2}$,
   where $D_f = \{(x,y)\,\epsilon\,\mathbb{R}^2 \mid x^2+y^2 \leq 4,\ y \geq 0\}$.

   (b) Would the result above be different if the domain of f is changed to
   $D_f = \{(x,y)\,\epsilon\,\mathbb{R}^2 \mid y \geq 0\}$? *(1/2 p)*

3. Find the points on the curve $x^4 + x^2y^2 + 4y^4 = 1$ that are closest to and farthest from the origin. *(1/4 p)*

4. Calculate the maximum and minimum values of $f(x,y,z) = 8x^2 + 4yz - 16z$
   subject to the constraint $4x^2 + y^2 + 4z^2 = 16$. *(1/2 p)*

5. Calculate the volume in the first octant $(x,y,z \geq 0)$ below the paraboloid
   $z = 1 - \dfrac{x^2}{9} - \dfrac{y^2}{4}$. *(1/4 p)*

6. Calculate $\iint\limits_D e^{x+y}\ dx\,dy$, where $D = \{(x,y)\,\epsilon\,\mathbb{R}^2 \mid |x|+|y| \leq a\}$, $(a>0)$. *(1/4 p)*