Mathematical analysis 2, WNE, 2018/2019
meeting 12.

28 March 2019

Problems

1. What is the direction in which f grows most rapidly P?
   a) $f(x,y) = \sin\frac{\pi xy}{4}$, $P = (3,1)$,
   b) $f(x,y,z) = e^x \sin y + e^y \sin z + e^z \sin x$, $P = (0,0,0)$.
2. Assume that we are at point $(-100,-100,430)$ on a mountain described by $z = 500 - 0.003x^2 - 0.004y^2$.
   a) In which direction the slope of the mountain is steepest?
   b) How steep is the mountain at this point (calculate the angle of the steepest tangent line)?
3. Find an equation of the tangent line to the curve described by the equation at point P?
   a) $2x^3 + 2y^3 - 9xy = 0$, $P = (1,2)$,
   b) $x^4 + xy + y^2 = 19$, $P = (2,-3)$.

Homework

Group 8:00

Check whether

$$f(x,y) = \begin{cases} (x^2+y^2)\sin\frac{1}{x^2+y^2} & \text{, for } (x,y) \neq (0,0) \\ 0 & \text{, for } (x,y) \neq (0,0) \end{cases}$$

Is differentiable at $(0,0)$. Calculate partial derivatives at this point.

Group 9:45

Check whether the function

$$f(x,y) = \sqrt[3]{x^3+y^3}$$

Is differentiable at $(0,0)$. Calculate partial derivatives at this point.