

MAC 2313 Calculus—Analytic Geometry III

Homework #2

Please hand in your solutions by February 25, 2008, 9:30 a.m.
Solutions that are handed in later will be graded with 0 points.

Problem 1 (Partial Derivatives) (6P)

Determine for each of the following functions $f(x, y)$ if it is a solution of Laplace's equation $f_{xx} + f_{yy} = 0$.

(a) $f(x, y) = \ln \sqrt{x^2 + y^2}$

(b) $f(x, y) = \sin(x) \cdot \cosh(y) + \cos(x) \cdot \sinh(y)$

Problem 2 (Implicit Differentiation) (4P)

Find $\partial z/\partial x$ and $\partial z/\partial y$, where the function $z = z(x, y)$ satisfies

$$x - z = \arctan(yz) \quad .$$

Problem 3: (Tangent Plane) (6P)

Let $f(x, y) = x \cdot e^y + x^2 y$. Find the equation $z = T(x, y)$ of the tangent plane at the point $(2, 0, f(2, 0))$.

Problem 4: (Directional Derivatives) (4P)

Let $f(x, y) = 3 \cdot x^2 + 3 \cdot y^2 - 6 \cdot x - 18 \cdot y + \pi$, and let $v = \langle mm, dd \rangle$ such that mm is the month and dd the day of your date of birth. Find the rate of change of f at the point $Q(1, 3, \pi - 30)$ in the direction of v .

Good luck, have fun & do not hesitate to ask questions!!!