
Math 2130 - Homework # 4

Tangent Plane and the Local Minimums and Maximums of a Function

Part 1 - Tangent plane

1. Let $f(x, y) = 4x^2 - y^2 + 2y$
 - (a) Find the tangent plane to f at $P = (-1, 2, 4)$.
 - (b) At what points $Q = (a, b, c)$ is the tangent plane horizontal?
2. Let $f(x, y) = y \ln(x)$.
 - (a) Find the tangent plane to f at $P = (1, 4, 0)$.
 - (b) At what points $Q = (a, b, c)$ is the tangent plane horizontal?

Part 2 - Local minimums and maximums and saddle points

3. Find the local maximums, local minimums, and saddle points of $f(x, y) = 9 - 2x + 4y - x^2 - 4y^2$
 4. Find the local maximums, local minimums, and saddle points of $f(x, y) = x^3 - 3x + y^3 - 3y$
 5. Find the local maximums, local minimums, and saddle points of $f(x, y) = x^4 + y^4 - 4xy + 2$
 6. Find the local maximums, local minimums, and saddle points of $f(x, y) = e^{-(x^2+y^2)}$
 7. Find the local maximums, local minimums, and saddle points of $f(x, y) = \ln(1 + x^2 + y^2)$
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