Homework 9

May 16, 2025

1. Let $f(x, y) = xe^y$, find the directional derivative of $f(x, y)$ at the point $(2, 0)$ in the direction of the vector $(1, 2)$.

2. Find the equations of the tangent plane and the normal line of the surface $z = x^2 + y^2$ at the point $P(2, -2, 8)$.

3. Find the local maxima, local minima, and saddle points of $f(x, y) = (x^2 + 3y^2)e^{1-x^2-y^2}$, if any.