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Solutions

Problem 1 (10 points)

Compute the partial derivatives f_x and f_y and the second partial derivatives f_{xx} and f_{xy} for $f(x, y) = x^2 e^{2y} + xy$.

$$f(x, y) = x^2 e^{2y} + xy$$

$$f_x = 2x e^{2y} + y$$

$$f_{xx} = 2e^{2y}$$

$$f_{xy} = 4x e^{2y} + 1$$

$$f_y = 2x^2 e^{2y} + x$$

Problem 2 (10 points)

Find an equation of the tangent plane to the graph of $f(x, y) = 4x^2 + 3xy$ at the point $(1, 2, 10)$.

$$z = z_0 + f_x(x - x_0) + f_y(y - y_0)$$

$$f(x, y) = 4x^2 + 3xy$$

$$f_x = 8x + 3y \Big|_{(1, 2, 10)} = 8(1) + 3(2) = 14$$

$$f_y = 3x \Big|_{(1, 2, 10)} = 3(1) = 3$$

$$z = 10 + 14(x - 1) + 3(y - 2)$$

$$z = 10 + 14x - 14 + 3y - 6$$

$$z = 14x + 3y - 10$$

$$\boxed{14x + 3y - z = 10}$$