14.3 Problem Set

Dr. Holmes

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1. For each function, find all first and second partials.

   (a) \[ f(x, y) = x^2 + 3x^2y - y^4 \]

   (b) \[ f(x, y) = xy^2 \sin(x^2) \]

   (c) \[ f(x, y) = x \ln(y) \]

2. For each function, find all first partials.

   (a) \[ f(x, y) = \frac{x}{x^2 - y^2} \]

   (b) \[ f(x, y, z) = xyz^2 \]

3. Find symmetric equations for the tangent line at \((1, 2, 3)\) to the intersection between

\[ x^2 - y^2 + z^2 = 6 \]

and the plane \(x = 1\). Hint: the slope can be determined as a partial derivative.