

Instructions: Show all work. Give exact answers (yes, that means fractions, square roots and exponentials, and not decimals) unless specifically directed to give a decimal answer. This will require some operations to be done by hand even if not specifically directed to. Be sure to complete all parts of each question.

1. Find the first partial derivatives for the function $z = e^y \sin xy$.

$$\frac{\partial z}{\partial x} = e^y \cos xy \cdot y$$

$$\frac{\partial z}{\partial y} = e^y \sin xy + e^y \cos xy \cdot x$$

2. Find the first partial derivatives for the function $f(x, y) = \tanh(xy^2)$.

$$\frac{\partial f}{\partial x} = \operatorname{sech}^2(xy^2) \cdot y^2$$

$$\frac{\partial f}{\partial y} = \operatorname{sech}^2(xy^2) \cdot 2xy$$