

Math 233 - Quiz 8

March 31, 2022

Name _____

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due April 5.

1. (2 points) Let $T = x^2y - xy^3 + 6x$, where $x = r \cos \theta$ and $y = r \sin \theta$. Use the chain rule to find $\partial T / \partial \theta$.

2. (2 points) Suppose z is implicitly defined as a function of x and y by the equation

$$xy^2z^3 - xe^{yz} + y \sin xz = 3y + x.$$

Find $\partial z / \partial y$.

Turn over.

3. (2 points) Find the directional derivative of $f(x, y) = xe^y - ye^x$ at $(0, 0)$ in the direction of $\vec{w} = 5\hat{i} - 2\hat{j}$.

4. (2 points) The electric potential at a point (x, y) is given by $V(x, y) = e^{-2x} \cos 3y$. Determine the direction in which the potential decreases most rapidly at the point $(0, \pi/4)$.

5. (2 points) Find an equation of the plane that is tangent to the surface

$$xz + yz^2 = 2 + yz^3$$

at the point $(2, -1, 1)$.