Math 233 - Quiz 4

Name _____

March 25, 2021

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due April 1.

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1. (2 points) Use the definition of differentiability to show that $f(x, y) = 2x^2 - 10y$ is differentiable on $\mathbb{R}^2$.

2. (3 points) Find equations of the tangent plane and the normal line (parametric and symmetric) at the point $(1, 0, 0)$.

$$z + 1 = xe^y \cos z$$

Turn over.

3. (2 points) Suppose that z is implicitly defined as a function of x and y by the following equation. Find $\partial z/\partial y$ and $\partial z/\partial x$.

$$x^3z + y^3z^3 - 9xyz + 4 = 0$$

4. (1 point) Over a certain region in space the electrical potential V is given by

$$V(x, y, z) = 5x^2 - 3xy + xyz.$$

At the point $(3, 4, 5)$, in which direction does the potential increase most rapidly?

5. (2 points) Find and classify the critical points of $f(x, y) = x^2 - 2xy + 2y^2 - 2x + 2y + 1$.