Math 233 - Quiz 10

Name _____

November 13, 2025

Score _____

Show all work to receive full credit. Supply explanations when necessary. Use other paper as necessary. This quiz is due November 18.

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1. (3 points) Find an equation of the plane tangent to the surface given by $z = x^2 - 2xy + 5y^2 + 3x - 2y + 4$ at the point $(1, 1, 9)$.

2. (4 points) The temperature at the point (x, y) on a metal plate is given by

$$T(x, y) = 4 + \sin(xy) + x + xy, \quad -2 \leq x \leq 2, -2 \leq y \leq 2.$$

   (a) Find the direction of greatest increase in temperature from the point $(0, 1)$.

   (b) At which point is there no increase or decrease in temperature regardless of which direction we look?

3. (3 points) Find and classify the critical points of $g(x, y) = x^2 + x - 3xy + y^3 - 5$.