Quiz 4

Be sure to follow the quiz instructions in order to avoid a deduction in points. Submissions are due in Gradescope by 11:59pm on Friday; no late work is accepted.

Name:

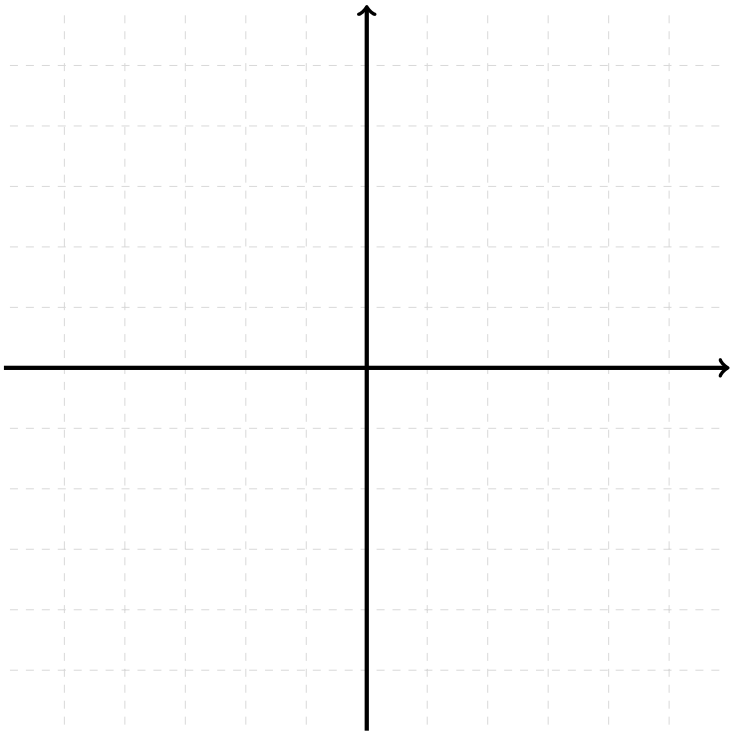
Question #1: Find and classify the critical points of the function $z = f(x, y)$.

$$f(x, y) = x^3 - 3xy^2 + 4x^2 + 2y^2$$

Question #2: Consider the surface of $\mathbb{R}^3$ containing the point P and defined by

$$2x^2 + z^2 = 1 + 3y^2 - xy, \ P(1, 2, 3).$$

Identify the function $F(x, y, z)$ such that the surface is a level set of F. Then, find ∇F and an equation for the plane tangent to the surface at P. Finally, find a parametric equation for the line normal to the surface at P.

Question #3: Sketch the domain R on the axes provided, and find the absolute maxima and minima of the function $f(x, y) = x^2 + xy + y^2$ on R.

R is bounded by $y = x^2$ and $y = 2$.