1. (15.1.41) Let \( f(x, y) = \sqrt{x + y} \). Draw a contour map of the function showing several level curves.

2. (15.2.16) Find the limit if it exists, or show that the limit does not exist.
\[
\lim_{(x, y) \to (0, 0)} \frac{xy^4}{x^2 + y^2}.
\]

3. (15.3.41) Given \( x^2 + y^2 + z^2 = 3xyz \). Use implicit differentiation to find \( \frac{\partial z}{\partial x} \) and \( \frac{\partial z}{\partial y} \).

4. (15.4.5) Find an equation of the tangent plane to the surface \( z = y \cos(x - y) \) at the point \((2, 2, 2)\).

5. (15.5.21) Let \( z = x^2 + xy^3 \) where \( x = uv^2 + w^3 \) and \( y = u + ve^w \). Use the Chain Rule to find the partial derivatives \( \frac{\partial z}{\partial u} \) and \( \frac{\partial z}{\partial v} \) when \( u = 2, v = 1, w = 0 \).

6. (15.6.39) Given \( x^2 + 2y^2 + 3z^2 = 21 \). Find an equation of the tangent plane to the surface at the point \((4, -1, 1)\).

7. (15.7.29) Let \( f(x, y) = x^2 + y^2 + x^2y + 4 \). Find the local maximum and minimum values and saddle point(s) of the function. Then find the absolute

8. (15.8.3) Use Lagrange multipliers to find the maximum and minimum values of the function \( f(x, y) = x^2 - y^2 \) subject to the constraint: \( x^2 + y^2 = 1 \).

9. (16.1.13) Evaluate the double integral \( \int \int_R (4 - 2y) \, dA \), \( R = [0, 1] \times [0, 1] \), by first identifying it as the volume of a solid.

10. (16.2.23) Find the volume of the solid that lies under the plane \( 3x + 2y + z = 12 \) and above the rectangle \( R = \{(x, y) | 0 \leq x \leq 1, -2 \leq y \leq 3 \} \).

11. (16.3.37) Sketch the region of integration and change the order of integration. \( \int_0^1 \int_0^{\sqrt{1-x^2}} f(x, y) \, dy \, dx \).

12. (13.4.13) Evaluate the integral by changing to polar coordinates. \( \int \int_D e^{-x^2-y^2} \, dA \), where \( D \) is the region bounded by the semicircle \( x = \sqrt{4 - y^2} \) and the \( y \)-axis.

13. (13.5.5) Let \( D \) be the triangular region with vertices \((0, 0), (2, 1), (0, 3)\) and \( \rho(x, y) = x + y \) be a density function. Find the mass and center of mass of the lamina that occupies the region \( D \).