1. Find all the first partial derivatives of the function \( f(x, y, z) = e^{x^3} + \sin(yz) \).

2. Find the domain and range and sketch two level curves of \( z = \sqrt{9 - x^2 - 3y^2} \).
3. Given \( f(x, y) = \frac{4x^2 + 7y^2}{7x^2 - 2y^2} \), discuss \( \lim_{(x, y) \to (0, 0)} f(x, y) \) and discuss the continuity of \( f(x, y) \).

4. Classify the critical points of \( 3x^2y + y^3 - 3x^2 - 3y^2 + 2 \).
5. Given \( v = x + \sin(y - z) + w^2 \), where \( x = s^2 \), \( y = \ln(s + t) \), \( z = s \cos(t) \), and \( w = s \sin(t) \), use the chain rule to find \( \frac{\partial v}{\partial s} \) and \( \frac{\partial v}{\partial t} \) in terms of \( s \) and \( t \).

6a. The temperature \( T \) at any point in a steel ball, centered at the origin, is given by
\[
T(x, y, z) = 360(x^2 + y^2 + z^2)^{-1/2}.
\]
Find the rate of change of \( T \) at (1, 2, 2) in the direction toward the point (2, 1, 3).

6b. Sketch a level surface of the temperature function.

6c. Find the rate of change of \( T \) if one travels along a curve lying on this level surface.
7. Find the points on the ellipsoid $x^2 + 2y^2 + 3z^2 = 1$ at which the tangent plane is parallel to the plane $3x - y + 3z = 1$.

8a. The two legs of a right triangle are measured as 5 m and 12 m, respectively, with a possible error in measurement of at most 0.2 cm in each. Use differentials to estimate the maximum error in the calculated value of the area of the triangle.

8b. Use differentials to estimate the maximum error in the calculated length of the hypotenuse.