1. a. Find an equation for the tangent plane of the graph of the equation $x^3 - 2xy + z^3 + 7y + 6 = 0$ at the point $(x, y, z) = (1, 4, -3)$.

b. Find equations for the normal line of the graph of the equation $x^3 - 2xy + z^3 + 7y + 6 = 0$ at the point $(x, y, z) = (1, 4, -3)$.

2. Let $f(x, y, z) = \frac{x}{y + z}$.
   a. Find the gradient $\nabla f(x, y, z)$ at the point $(4, 1, 1)$.

b. Find the directional derivative $D_u f$ at $(4, 1, 1)$ for the unit vector $u$ in the direction of $v = 2i - j - 2k$.

3. Find all critical points of $f(x, y) = 4xy - x^4 - y^4$ and classify them as maxima, minima, or saddle points.