(1) Find the gradient and Wronskian matrix for the following functions.
   (a) $f(x, y) = x^2 y - \frac{z}{y}$

   (b) $g(x, y, z) = \arctan x + 5xy^2z^3 - 11y$

(2) Find the tangent plane/hyperplane to the graph of the function at the given point.
   (a) $f(x, y) = x + \tan(xy) - y^2$ at $(x_0, y_0) = (0, 2)$

   (b) $g(x, y, z) = \ln x + yz \sin y - xz^2$ at $(x_0, y_0, z_0) = (2, 0, -1)$. 
(3) Find the directional derivative of ...
(a) the function \( f(x, y) = x^2e^{-y} \) at the point \((1, 0)\) in the direction of \( \mathbf{v} = (1, -1) \).

(b) the function \( g(x, y, z) = x^2 + xy + e^{5z} \) at the point \((1, 2, 0)\) in the direction of \( \mathbf{v} = (2, 2, 1) \).

(4) You are standing on a hill. If you face north, the slope is 2 (it is a steep hill). If you face east, the slope is \(-1\).
(a) In what direction is the slope a maximum, and what is it?
(b) In what direction is the slope zero?

(5) Locate and classify the stationary points (if any) on the surfaces given below.
(a) \( z = 2x + 5y - 1 \)

(b) \( z = x^2 - xy + y^2 - 2x + y \)

(c) \( z = x^3 + y^3 - 3xy \)
(6) Find the function $V$ such that $\nabla V$ is the given vector function.
(a) $f(x, y) = (x + y^2, 2xy - 4)$

(b) $g(x, y, z) = (1 + y^2 z, y + 2xyz, y + z + xy^2)$

(7) Solve the differential equation.
(a) $y + 1 + (x - 1)y' = 0$

(b) $3x^2 + y^2 + 2xyy' = 0$