Clex 5: Partial derivatives

Problem 1: Just derivatives

Calculate all first and all second partial derivatives of the function

$$f(x, y, z) = x^2 - 2\sqrt{y^2 + z^2}$$

Problem 2: Tangent hyperplane

Determine the the tangent hyperplane and the normal vector to the graph of the function

$$f(x, y, z) = xy^2 + y \cos(\pi(z - 1))$$

at the point $(x, y, z) = (2, 1, 2)$.

Problem 3: Horizontal tangent plane

Determine all horizontal tangent planes for the graph of the function

$$z = x^3 + 3xy + y^3$$