The Geometric Interpretation of Partial Derivatives

Assume that $z = f(x, y)$ is a function of two variables which represents a surface in three-dimensional space. Compute the partial derivatives $z_x$ and $z_y$. Evaluate these partial derivatives at the point $(a, b)$. Then

$z_x$ is the **slope** (measured along the $x$-axis) of line $L_1$, which is **tangent** to the surface at the point $(a, b, f(a, b))$, and

$z_y$ is the **slope** (measured along the $y$-axis) of line $L_2$, which is **tangent** to the surface at the point $(a, b, f(a, b))$.

**NOTE**: Line $L_1$ lies in the plane $y = b$. Line $L_2$ lies in the plane $x = a$. 

![Diagram of a geometric interpretation of partial derivatives]

- **Surface**: $z = f(x, y)$
- **Line $L_1$**: $x = a$
- **Line $L_2$**: $y = b$
- **Plane $X = a$**
- **Plane $Y = b$**