

MATH 112A Review: Geometric meaning of gradient and Linearization

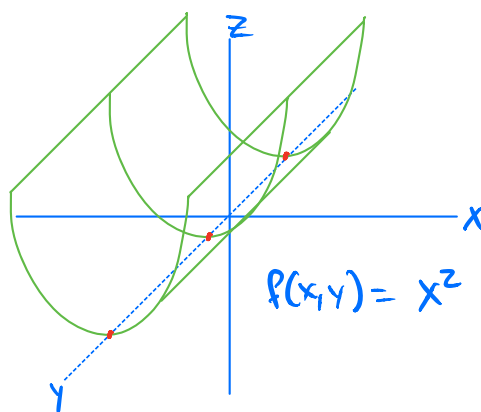
Facts to Know:

Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}$. we define the gradient ∇f of f at the point p to be the vector:

$$\nabla f(p) =$$

Geometrical interpretation:

- If $\nabla f(p)$ is a _____ vector, then the vector $\nabla f(p)$ is the direction that the most quickly away from p .
- $\|\nabla f(p)\|$ is the _____ in direction $\nabla f(p)$.



The linearization of f at the point p is:

$$L_f(x,y) =$$

Examples: Let $f(x,y) = e^{xy^2}$.

1. What is the gradient of f at the point $(1,2)$?
2. What direction increases the fastest from the point $(1,2)$ and what is the rate of change in the same direction?

3. What is the linearization of f at the point $(1, 2)$?