

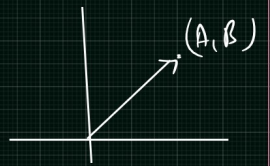
# GRADIENTS

1. MEANING
2. GRAPHICAL REPRESENTATION
3. GRADIENT ASCENT & DESCENT
4. RELATION WITH RESPECT TO DEEP LEARNING

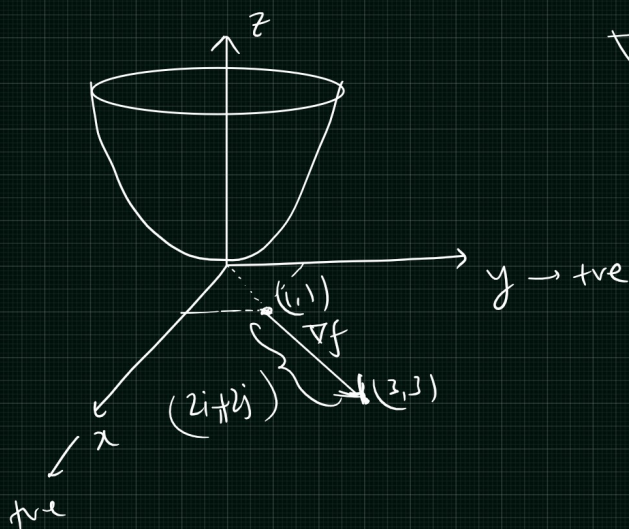
$$z = f(x, y)$$

$$\nabla f(x, y) = \frac{\partial f}{\partial x} \hat{i} + \frac{\partial f}{\partial y} \hat{j} = \begin{bmatrix} \partial f / \partial x \\ \partial f / \partial y \end{bmatrix}$$

slope  $\nwarrow$   
 $\underline{A} \hat{i} + B \hat{j}$



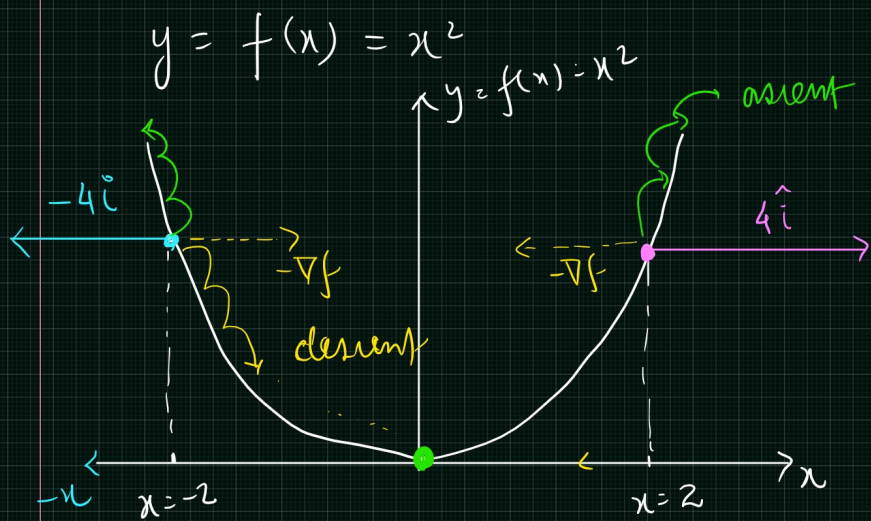
$$f(x, y) = x^2 + y^2$$



$$\nabla f(x, y) = \frac{\partial f}{\partial x} \hat{i} + \frac{\partial f}{\partial y} \hat{j}$$
$$= 2x \hat{i} + 2y \hat{j}$$

$$\nabla f(x, y) \Big|_{\substack{x=1 \\ y=1}} = 2(1) \hat{i} + 2(1) \hat{j}$$
$$= 2\hat{i} + 2\hat{j}$$





$$\nabla f(x) = \frac{\partial f}{\partial x} i = 2x \hat{i}$$

$$\nabla f(x=2) = 2(2) \hat{i} = 4 \hat{i}$$

$$\nabla f(x=-2) = 2(-2) \hat{i} = -4 \hat{i}$$

$f \rightarrow \log f$

$\underline{f}(w, b)$