

Tangent Plane Calculation

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

Tangent plane at $(1,2)$?

$$f_x(x,y) = 2x \quad f_x(1,2) = 2$$

$$f_y(x,y) = 2y \quad f_y(1,2) = 4$$

Normal vector: $(2, 4, -1)$

$f_x(1,2)$ $f_y(1,2)$ $\swarrow$ always -1

Point: $(1, 2, 1^2 + 2^2) = (1, 2, 5)$

Thus, the plane

is given by:

$$\begin{cases} (2, 4, -1) \cdot (x-1, y-2, z-5) = 0 \\ 2(x-1) + 4(y-2) - (z-5) = 0 \\ 2x + 4y - z = 5 \end{cases}$$

If we solve
for z :

$$z = 2x + 4y - 5$$

$h(x,y)$

← this function $h(x,y)$ is the
linearization of f at $(1,2)$.