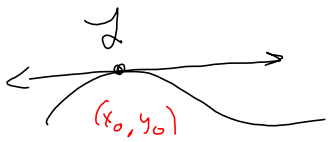
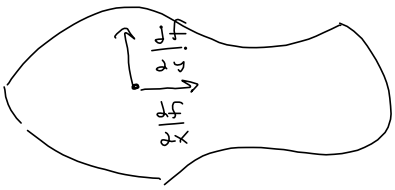
We don't have $\frac{df}{dx}$ telling us everything about the "shape." We have 2 dimensions to worry about, now.

$y = m(x-x_0)+y_0$ POINT-SLOPE AS IT SHOULD be taught!

$\mathcal{L}: f'(x_0)(x-x_0)+y_0$





$\frac{\partial f}{\partial x}$ = partial of f with respect to x.

$\frac{\partial f}{\partial y}$ = partial of f wrt y.

$f(x,y) = x^2y + \sin(x^3y)$

$\frac{\partial f}{\partial x} = f_x = 2xy + (\cos(x^3y))(3x^2y)$

$\frac{\partial f}{\partial y} = f_y = x^2 + (\cos(x^3y))x^3$

f_x and f_y are 2 vectors defining a tangent PLANE.

$f(x,y)$ given ⟹

Tangent Plane at (x_0, y_0) is

$z = f_x(x_0,y_0)(x-x_0) + f_y(x_0,y_0)(y-y_0)$