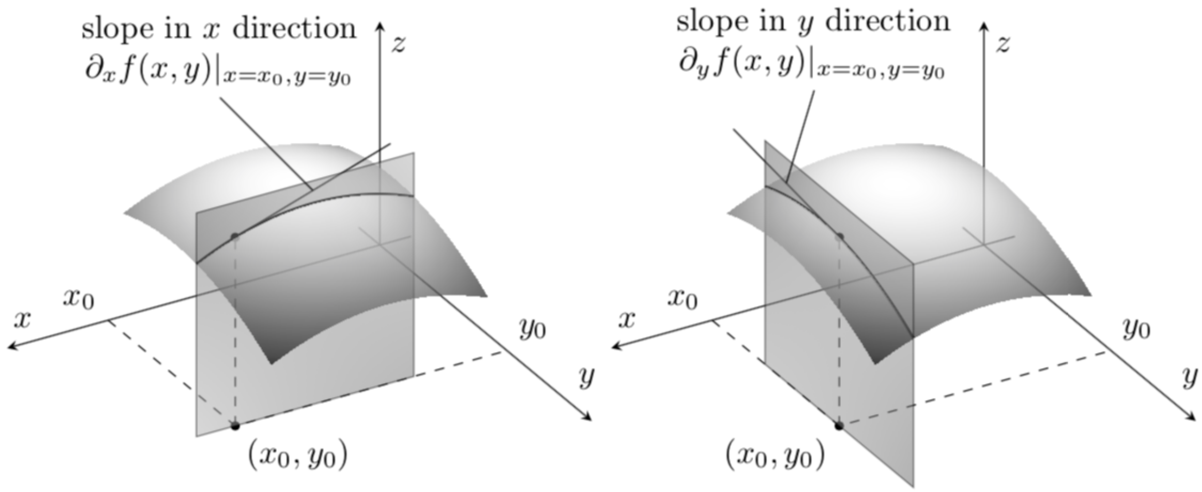
Partial derivatives are computed just like ordinary derivatives in one variable with this difference: To compute f_x, treat y as a constant,and to compute f_y, treat x as a constant.



1. Compute the partial derivatives of $f(x, y) = x^2 y^5$

2. Calculate $g_x(1, 3)$ and $g_y(1, 3)$, where $g(x, y) = \frac{y^2}{(1+x^2)^3}$

3. Calculate $\frac{d}{dx}\sin(x^2 y^5)$

4. Calculate $f_z(0, 0, 1, 1)$, where $f(x, y, z, w) = \frac{e^{xz+y}}{z^2+w}$

5. Calculate the second-order partial derivatives of $f(x, y) = x^3 + y^2e^x$

6. Calculate f_{xyy} for $f(x, y) = x^3 + y^2e^x$

Clairut's Theorem: Equality of Mixed Partials
If f_{xy} and f_{yx} are both continuous functions on a disk D, then $f_{xy}(a, b) = f_{yx}(b, a)$ for all $(a, b) \in D$.

$$\frac{d^2 f}{dxdy} = \frac{d^2 f}{dydx}$$

7. Calculate the partial derivative g_{zzwx} where $g(x, y, z, w) = x^3 w^2 z^2 + \sin(\frac{xy}{z^2})$