

## Section 8.2: Partial Derivatives

A **partial derivative** is a way to examine how a function changes when all of the variables except one are held constant.

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Example: Find all first and second partials of these functions.

A)  $f(x, y) = x^2 + 3y^2 + 3x^2y^4 + 7$

B)  $f(x, y) = y^4 - x^2y^3$

C)  $f(x, y) = (x^2 + y^2)^4$

Example:  $f(x, y) = 4x^{0.3}y^{0.7}$  with  $x$  and  $y$  in millions.

A) Evaluate and interpret  $f_x(5, 1)$ .

B) Compute the marginal productivity of capital when 5 million is spent on labor and 1 million is spent on capital.

Example: Find all first and second partials of  $g = \frac{x - y}{x + y}$

Example: Find all first partials of  $f = \ln(x^2 - y^3 + 1)$

Example: Find all first partials of  $h = y^2 e^{4xy^2}$