

Derivative

$d(f, x)$ returns the derivative of f with respect to x .

$d(x^2, x)$

$2x$

Extend the argument list for multiderivatives.

$f = 1 / (x + y)$

$d(f, x, y)$

$$\frac{2}{(x + y)^3}$$

$d(\sin(x), x, x)$

$-\sin(x)$

Another syntax for n th derivative.

$d(\sin(x), x, 2)$

$-\sin(x)$

The gradient of f is returned for vector x in $d(f, x)$.

$r = \text{sqrt}(x^2 + y^2)$

$d(r, (x, y))$

$$\begin{bmatrix} \frac{x}{(x^2 + y^2)^{1/2}} \\ \frac{y}{(x^2 + y^2)^{1/2}} \end{bmatrix}$$

The f in $d(f, x)$ can be a vector or higher rank function. Gradient increases rank by one.

$F = (x^2, y^2)$

$X = (x, y)$

$d(F, X)$

$$\begin{bmatrix} 2x & 0 \\ 0 & 2y \end{bmatrix}$$