Math 333
Some Practice with Partial Derivatives

Suppose that $f(t, y)$ is a function of both t and y. The partial derivative of f with respect to y, written

$$\frac{\partial f}{\partial y},$$

is the derivative of f with respect to y with t held constant. To find $\frac{\partial f}{\partial y}$, you should consider t as a constant and then find the derivative of f with respect to y.

Example. Suppose $f(t, y) = t^2 \sin(y^3)$. Then

$$\frac{\partial f}{\partial y} = t^2 \cos(y^3) \cdot 3y^2.$$

Some Practice Problems.

1. Suppose $f(t, y) = t^3 y^2$. Find $\frac{\partial f}{\partial y}$.
2. Suppose $f(t, y) = e^{t+y}$. Find $\frac{\partial f}{\partial y}$.
3. Suppose $f(t, y) = \ln(t^2 y)$. Find $\frac{\partial f}{\partial y}$.
4. Suppose $f(t, y) = \cos(ty)$. Find $\frac{\partial f}{\partial y}$.
5. Suppose $f(t, y) = \frac{ty}{\sin(t^3+y^2)}$. Find $\frac{\partial f}{\partial y}$.

Answers to the Practice Problems.

1. $\frac{\partial f}{\partial y} = 2t^3 y$
2. $\frac{\partial f}{\partial y} = e^{t+y}$
3. $\frac{\partial f}{\partial y} = \frac{1}{t^2 y} \cdot t^2$
4. $\frac{\partial f}{\partial y} = -\sin(ty) \cdot (t)$
5. $\frac{\partial f}{\partial y} = \frac{t - \cos(t^3+y^2) 2y}{\sin^2(t^3+y^2)}$