

Quiz 4 - Sections 6 and 9

Fall 2012

1. (6 points) Compute $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for $f(x, y) = x \sin y + (3y^2 + y^6)^{3/4}$.

Solution:

For $\frac{\partial f}{\partial x}$:

$$\begin{aligned}\frac{\partial f}{\partial x} &= \sin y + \frac{3}{4}(3x^2 + y^6)^{-1/4}6x \\ &= \sin y + \frac{9x}{2}(3x^2 + y^6)^{-1/4}\end{aligned}$$

For $\frac{\partial f}{\partial y}$:

$$\begin{aligned}\frac{\partial f}{\partial y} &= x \cos y + \frac{3}{4}(3x^2 + y^6)^{-1/4}6y^5 \\ &= x \cos y + \frac{9y^5}{2}(3x^2 + y^6)^{-1/4}\end{aligned}$$

2. (6 points) If $w = w(x, y, z)$ and $x = x(u, v)$, $y = y(u, v)$ and $z = z(u, v)$, show how to write the Chain Rule for $\frac{\partial w}{\partial v}$

Solution:

$$\frac{\partial w}{\partial v} = \frac{\partial w}{\partial x} \frac{\partial x}{\partial v} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial v} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial v}$$