NAME: ...Solutions..... Math 2551 (L1-L3)
2/18/2016

Quiz 4

(15 pts.) **1.** For the functions below, find the partial derivatives with respect to <u>each</u> of the independent variables:

a). $w = ze^{2x-5y}$.

$\frac{\partial w}{\partial x} = 2ze^{2x-5y}$ (3 pts.)

$\frac{\partial w}{\partial y} = -5ze^{2x-5y}$ (3 pts.)

$\frac{\partial w}{\partial z} = e^{2x-5y}$ (3 pts.)

b). $z = x\sin(x^2+3y)$.

$\frac{\partial z}{\partial x} = \sin(x^2+3y) + 2x^2\cos(x^2+3y)$ (3 pts.)

$\frac{\partial z}{\partial y} = 3x\cos(x^2+3y)$ (3 pts.)

(5 pts) **2.** If

$$g(s,t) = f\left(e^{t-s}, e^{s-t}\right),$$

where f is a differentiable function, find:

$$\frac{\partial g}{\partial s} + \frac{\partial g}{\partial t}.$$

Hint: Don't panic because you don't know exactly what the partial derivatives of f look like - it works out.

$g(s,t) = f(x,y)$, where $x(s,t) = e^{t-s}$; $y(s,t) = e^{s-t}$ (1/2 pt.)

Chain Rule: $\frac{\partial g}{\partial s} = \frac{\partial f}{\partial x}\frac{\partial x}{\partial s} + \frac{\partial f}{\partial y}\frac{\partial y}{\partial s} = -e^{t-s}\frac{\partial f}{\partial x} + e^{s-t}\frac{\partial f}{\partial y}$ (2 pts.)

$\frac{\partial g}{\partial t} = \frac{\partial f}{\partial x}\frac{\partial x}{\partial t} + \frac{\partial f}{\partial y}\frac{\partial y}{\partial t} = e^{t-s}\frac{\partial f}{\partial x} - e^{s-t}\frac{\partial f}{\partial y}$ (2 pts.)

$\oplus$

$\frac{\partial g}{\partial s} + \frac{\partial g}{\partial t} = \boxed{0}$ (1/2 pt.)