Calculus IV Quiz 2 Summer 2000 6/9/2000

1. Show that $\lim\limits_{(x,y)\to(0,0)} \frac{x-y}{\sqrt{x^2+y^2}}$ does not exist.

5/5

approach on $x=0$ $\quad \frac{-y}{y} = -1$

approach on $y=0$ $\quad \frac{x}{x} = 1$

$-1 \neq 1$ DNE

Since approach on two different lines result in different limits (ie -1 or 1) the limit $\lim\limits_{(x,y)\to(0,0)} \frac{x-y}{\sqrt{x^2+y^2}}$ does not exist

Great

5/5

2. Compute all first and second-order derivatives of the function $f(x,y) = x^4 + y^4 - 4xy + 1$.

$f_x = 4x^3 - 4y$

$f_y = 4y^3 - 4x$

→ first order partial derivatives

$f_{xx} = 12x^2$

$f_{xy} = -4$

$f_{yy} = 12y^2$

$f_{yx} = -4$

→ second order partial derivatives

Great

3. Write an equation for the plane tangent to $g(x,y) = \ln(x - y)$ at the point (2, 1, 0).

$$z - z_0 = f_x(x_0,y_0)(x-x_0) + f_y(x_0,y_0)(y-y_0)$$

$f_x(x,y) = \frac{1}{(x-y)} \cdot 1$

$f_y(x,y) = \frac{1}{(x-y)} \cdot (-1)$

$f_x(2,1) = \frac{1}{2-1} = 1$

Nice

$f_y(2,1) = \frac{1}{2-1} \cdot -1 = -1$

$$z - 0 = (1)(x-2) + (-1)(y-1)$$