

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 7

Question 1. (7 marks) Find the limit, if it exists, or show that the limit does not exist

$$(a) \lim_{(x,y) \rightarrow (2,1)} \frac{4-xy}{x^2+3y^2} = \frac{4-2 \cdot 1}{(2)^2+3(1)^2} = \frac{2}{7}$$

$$(b) \lim_{(x,y) \rightarrow (0,0)} \frac{x^2-4y^2}{x^2+2y^2} \quad \text{LET } f(x,y) = \frac{x^2-4y^2}{x^2+2y^2}$$

ALONG $y=0$ $\Rightarrow f(x,0) = \frac{x^2}{x^2} = 1 \rightarrow 1$ AS $x \rightarrow 0$

So $f(x,y) \rightarrow 1$ AS $(x,y) \rightarrow (0,0)$ ALONG $y=0$.

ALONG $x=0$ $\Rightarrow f(0,y) = \frac{-4y^2}{2y^2} = -2 \rightarrow -2$ AS $y \rightarrow 0$

So $f(x,y) \rightarrow -2$ AS $(x,y) \rightarrow (0,0)$ ALONG $x=0$.

Question 2. (3 marks) Find the first partial derivatives of $f(x,y,z) = xz - 5x^2y^3z^4$

$$f_x(x,y,z) = z - 10xy^3z^4$$

$$f_y(x,y,z) = -15x^2y^2z^4$$

$$f_z(x,y,z) = x - 20x^2y^3z^3$$