MA 138 Worksheet #23

Sections 10.2 & 10.3

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1. The goal is to find the limit $\lim\limits_{(x,y)\longrightarrow(0,0)} \dfrac{5x^2-y^2}{x^2+y^2}$. We proceed in the following steps:

(a) Find the limit along the line $y=3x$;

(b) Find the limit along he line $y=4x$;

(c) Find the limit along the line $y=mx$;

(d) What is the limit?

2. Find the limits:

(a) $\lim\limits_{(x,y)\longrightarrow(2,3)} e^{\sqrt{5x^2+4y^2}}$

(b) $\lim\limits_{(x,y)\longrightarrow(0,0)} \dfrac{xy^2}{x^2+y^4}$

3. Find the partial derivatives $f_x(x,y)$ and $f_y(x,y)$ of the function $f(x,y)=\dfrac{7x+3y}{5x-9y}$.

4. Given $f(x,y)=6x^3y+9xy^3$, compute $\dfrac{\partial^2 f}{\partial x^2}$, $\dfrac{\partial^2 f}{\partial y^2}$, $\dfrac{\partial^2 f}{\partial x\partial y}$, and $\dfrac{\partial^2 f}{\partial y\partial x}$.