MATH 210
Homework 4
Due: Saturday 09/26/2020 11:59 PM

1. Use the two-path method in order to show that the limit:

$$\lim_{(x,y)\to(0,0)} \frac{x^3 y}{x^6 + y^2}$$

does not exist.

2. Use the definition of partial derivative as the limit of a difference quotient in order to compute $f_x(0,0)$ for

$$f(x,y) = \begin{cases} \dfrac{5xy^3 - 2x^5}{(x^2 + y^2)^2} & \text{if } (x,y) \neq (0,0) \\ 0 & \text{if } (x,y) = (0,0) \end{cases}$$

3. Let $f(x,y) = \dfrac{x^2}{x - 3y^2}$. Compute $f_x(4,1)$, $f_y(4,1)$ and $f_{xy}(4,1)$.