

**Section: 71**

Name &amp; Surname: \_\_\_\_\_

**SOLUTION KEY**

Math 120 Spring 2017-2018

Quiz no.: 04

ID Number: \_\_\_\_\_

Date: 06.04.18

Time Limit: ~15 Minutes

Grade: \_\_\_\_\_

1. Let  $f(x, y)$  be the function defined by

$$f(x, y) = \begin{cases} \frac{x^3 - 2y^2}{x^2 + y^2} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$$

Find  $f_x(1, 0)$ .For every  $(x, y) \neq (0, 0)$ 

$$\begin{aligned} f_x(x, y) &= \frac{3x^2(x^2 + y^2) - 2x(x^3 - 2y^2)}{(x^2 + y^2)^2} = \frac{3x^4 + 3x^2y^2 - 2x^4 + 4xy^2}{(x^2 + y^2)^2} \\ &= \frac{x^4 + 3x^2y^2 + 4xy^2}{(x^2 + y^2)^2} \end{aligned}$$

$$\text{Thus, } f_x(1, 0) = \frac{1^4 + 3 \cdot 1^2 \cdot 0^2 + 4 \cdot 1 \cdot 0^2}{(1^2 + 0^2)^2} = 1$$