University of DJilaly Bounaama – khmis meliana

Mathematics 2

Faculty of Economic, Commercial and Management Sciences

First year

Series 02: (Functions with two variables)

First exercise:

Let the following function be:

$$f(x,y) = 2x^2 + y^2 + 7$$

1. Find the function definition set.
2. Calculate:

$$\boldsymbol{f(0,0),\ f(-1,2),\ f(3,5), f(0,-1)}$$

Second exercise:

Find the definition field of the following functions:

$$f(x,y) = \frac{x+y}{x^2+y^2} \qquad f(x,y) = \frac{5x+y^2-3}{x-y} \qquad f(x,y) = \sqrt{y+x}$$

$$f(x,y) = \frac{\sin(xy)}{\sqrt{4+x^2+y^2}} \qquad f(x,y) = \frac{3xy}{x^2+y^2+3} \qquad f(x,y) = \sqrt{y^2-5x+6y}$$

$$f(x,y) = e^{xy} + \ln(xy) \qquad f(x,y) = e^{5x-y^2+1} \qquad f(x,y) = \frac{x-y}{x^2-y^2}$$

Third exercise:

Find the first-order partial derivatives of the following functions:

$$f(x,y) = x^3 + y^2 \qquad f(x,y) = e^{2x}\cos(3y)$$

$$f(x,y) = \sqrt{x^2+y^2} \qquad f(x,y) = x^2 + y^2 + xy - 5$$

$$f(x,y) = (x^2+4y^3)^5 \qquad f(x,y) = \sin(x^2+y^2)$$

Fourth exercise:

Calculate:

$$f'_x(1,-1)\ ,f'_y(1,-1)$$

For function:

$$.f(x,y) = \ln(1+xy^2)$$

Fifth exercise:

Find the second-order partial derivatives of the following functions:

1) $f(x,y) = x^2 + xy^2$, **2)** $f(x,y) = ln(3x - 5y)$, **3)** $f(x,y) = x^2 + 2y^2 - \frac{x^3}{y}$

4) $f(x,y) = e^{2x^2+xy+7x+y^2}$, **5)** $f(x,y) = sin(xy)$

Sixth exercise:

We say that a given function satisfies Laplace's equation if it satisfies the following condition:

$f(x,y) = e^{-3y}\cos 3x \qquad \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0$