Question

Obtain all the first and second order partial derivatives of the function

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

Solution

$$f_x(x, y) = (x^2 + y^2)'_x = 2x + 0 = 2x$$

$$f_y(x, y) = (x^2 + y^2)'_y = 0 + 2y = 2y$$

$$f_{xx}(x, y) = f_{x^2}(x, y) = (x^2 + y^2)'_{xx} = (2x + 0)'_x = 2$$

$$f_{yy}(x, y) = f_{y^2}(x, y) = (x^2 + y^2)'_{yy} = (2y + 0)'_y = 2$$

$$f_{xy}(x, y) = f_{yx}(x, y) = (x^2 + y^2)'_{xy} = (2x + 0)'_y = 0$$

Answer:

$$f_x(x, y) = 2x$$

$$f_y(x, y) = 2y$$

$$f_{xx}(x, y) = 2$$

$$f_{yy}(x, y) = 2$$

$$f_{xy}(x, y) = f_{yx}(x, y) = 0$$