Assignment 4

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June 6, 2022

1) Find and sketch the domain of the function $f(x,y) = \sqrt{r} + \sqrt{1-x^2-y^2}$.

Solution

2) Let $f(x,y) = 4 - x^2 - 5y^2$. Find $f_x(1,1)$ and $f_y(1,1)$ and interpret these numbers as slopes.

Solution

$$f_x(x,y) = -2x \qquad f_y(x,y) = -10y$$
$$f_x(1,1) = -2(1) = -2 \qquad f_y(1,1) = -10(1) = -10$$

At the point where $x = 1$ and $y = 1$, the slopes of the lines tangent to $f(x,y) = 4-x^2-5y^2$ parallel to the x- and y-axes respectively are -2 and -10.

3) Let $f(x,y) = x^3 + xy^2 - 3y^2$. Find f_x, f_y, f_{xx}, f_{yy}, and f_{xy}.

Solution

$$f_x(x,y) = 3x^2 + y^2 \qquad f_y(x,y) = 2xy - 6y$$
$$f_{xx}(x,y) = 6x \qquad f_{yy} = 2x - 6$$
$$f_{xy} = 2y$$