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MAC 2313.3118
Cyr

Quiz 4

You must show all work to receive full credit!!

Problem 1. Let $f(x, y) = \sqrt{4 - (x^2 + y^2)}$.

(a) (2 pts) Evaluate $f(1, 1)$.

$$\begin{aligned} f(1, 1) &= \sqrt{4 - (1^2 + 1^2)} = \sqrt{4 - (1+1)} \\ &= \sqrt{4 - 2} = \boxed{\sqrt{2}} \end{aligned}$$

(b) (3 pts) Find the domain of $f(x, y)$.

$$4 - (x^2 + y^2) \geq 0 \Rightarrow x^2 + y^2 \leq 4$$

$$\text{Domain} = \{(x, y) \mid x^2 + y^2 \leq 4\}$$

(c) (2 pts) Find the range of $f(x, y)$ (write your answer in interval notation).

$$\text{Since } \sqrt{4 - (x^2 + y^2)} \geq 0 \text{ and } x^2 + y^2 \geq 0 \text{ implies } 4 - (x^2 + y^2) \leq 4,$$

$$\text{so } \sqrt{4 - (x^2 + y^2)} \leq \sqrt{4} = 2.$$

$$\text{Thus, range} = [0, 2]$$

(d) (3 pts) Write an equation for the level curve $f(x, y) = 1$, and use it to describe the graph of the level curve.

$$\sqrt{4 - (x^2 + y^2)} = 1 \Rightarrow 4 - (x^2 + y^2) = 1 \Rightarrow \boxed{x^2 + y^2 = 3}$$

It is a circle centered at the origin of radius $\sqrt{3}$.