Math215

Homework 6, Problem 2

November 24, 2021

11.1 Problem 12

Find and sketch the domain of the function: $f(x, y, z) = ln(16 - 4x^2 - 4y^2 - z^2)$

Solution:

$$16 - 4x^2 - 4y^2 - z^2 > 0$$
$$4x^2 + 4y^2 + z^2 < 16$$
$$\frac{x^2}{4} + \frac{y^2}{4} + \frac{z^2}{16} < 1$$
$$\frac{x^2}{2^2} + \frac{y^2}{2^2} + \frac{z^2}{4^2} < 1$$

The domain is an ellipsoid bounded by $\frac{x^2}{2^2} + \frac{y^2}{2^2} + \frac{z^2}{4^2} < 1$