Math 23B
Multivariable Calculus
Fall 1999, UCSC

Nov 15, 1999

QUIZ 8

Time: 15min

1. Let S be the surface described by $z = f(x, y)$. Show that the unit normal vector field to S is given by $\pm\mathbf{n}$, where

$$\mathbf{n} := \frac{1}{\sqrt{1 + \|\nabla(f)\|^2}}\left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, -1\right).$$

Hint: Note that S may be parametrized by $\Phi(x, y) := (x, y, f(x, y))$, and recall the formula for the unit normal to a parametrized surface: $\mathbf{n} := (\frac{\partial \Phi}{\partial x} \times \frac{\partial \Phi}{\partial y})/\|\frac{\partial \Phi}{\partial x} \times \frac{\partial \Phi}{\partial y}\|$.

2. Compute the unit normal to the Cone $z = \sqrt{x^2 + y^2}$.

The first problem is worth 6 points and the second is worth 4 points.

LaTeX ..... MG