Answer on Question #56125 – Math – Vector Calculus

Let φ=2x^z^4−x^2y, find

|∇φ|

5(√97)

3(√112)

(√105)

2(√93)

Solution

$$\nabla\varphi = \left(\frac{\partial\varphi}{\partial x}, \frac{\partial\varphi}{\partial y}, \frac{\partial\varphi}{\partial z}\right) = \left(\frac{\partial(2xz^4 - x^2y)}{\partial x}, \frac{\partial(2xz^4 - x^2y)}{\partial y}, \frac{\partial(2xz^4 - x^2y)}{\partial z}\right) = (2z^4 - 2xy, -x^2, 8xz^3).$$

$$|\nabla\varphi| = \sqrt{(2z^4 - 2xy)^2 + (-x^2)^2 + (8xz^3)^2}.$$

If we need the number in the answer we need to choose a point (x_0, y_0, z_0) where we calculate $|\nabla\varphi|$.