T P 04 Ej. 12-d

Determinar el vector gradiente de la siguiente función en los puntos indicados.

$$\boldsymbol{f(x\ ,y\ ,z) = Ln(2 + x^2 + y^4 + z^6) \qquad en \quad (1\ ,2\ ,0)}$$

Sabiendo que: $\vec{\nabla} f(x, y, z) = \left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}\right)$

Derivando con respecto a “x”

$$\boldsymbol{\frac{\partial f}{\partial x}(x, y, z) = \frac{2.x}{2 + x^2 + y^4 + z^6}}$$

Derivando con respecto a “y”, tenemos:

$$\boldsymbol{\frac{\partial f}{\partial y}(x, y, z) = \frac{4.y^3}{2 + x^2 + y^4 + z^6}}$$

Derivando con respecto a “z”, tenemos:

$$\boldsymbol{\frac{\partial f}{\partial z}(x, y, z) = \frac{6.z^5}{2 + x^2 + y^4 + z^6}}$$

Evaluando las derivadas parciales en $(1\ ,2\ ,0)$, tenemos:

$$\boldsymbol{\frac{\partial f}{\partial x}(1, 2, 0) = \frac{2.1}{2 + 1^2 + 2^4 + 0^6} = \frac{2}{19}}$$

$$\boldsymbol{\frac{\partial f}{\partial y}(1, 2, 0) = \frac{4.2^3}{2 + 1^2 + 2^4 + 0^6} = \frac{36}{19}}$$

$$\frac{\partial f}{\partial z}(1,2,0) = \frac{6.0^5}{2+1^2+2^4+0^6} = 0$$

Finalmente:

$$\vec{\nabla} f(1,2,0) = \left(\frac{\partial f}{\partial x}(1,2,0); \frac{\partial f}{\partial y}(1,2,0); \frac{\partial f}{\partial z}(1,2,0)\right) = \left(\frac{2}{19}, \frac{36}{19}, 0\right)$$