TP4 Parte A Integrales de línea:

6 (a) $f(x,y,z) = (x^2+y^2+z^2)^{-1/2}$

$\nabla f(x,y,z) = (f_x ; f_y ; f_z)$

$f_x = -\frac{1}{2}(x^2+y^2+z^2)^{-3/2} \cdot 2x = \frac{-x}{\sqrt{(x^2+y^2+z^2)^3}}$

$f_y = -\frac{1}{2}(x^2+y^2+z^2)^{-3/2} \cdot 2y = \frac{-y}{\sqrt{(x^2+y^2+z^2)^3}}$

$f_z = -\frac{1}{2}(x^2+y^2+z^2)^{-3/2} \cdot 2z = \frac{-z}{\sqrt{(x^2+y^2+z^2)^3}}$

$\nabla f(x,y,z) = \left(\frac{-x}{\sqrt{(x^2+y^2+z^2)^3}} ; \frac{-y}{\sqrt{(x^2+y^2+z^2)^3}} ; \frac{-z}{\sqrt{(x^2+y^2+z^2)^3}}\right)$

(b) $f(x,y,z) = \ln\sqrt{x^2+y^2+z^2}$

$\nabla f(x,y,z) = (f_x, f_y, f_z)$

$f_x = \frac{1}{\sqrt{x^2+y^2+z^2}} \cdot \frac{1}{2\sqrt{x^2+y^2+z^2}} \cdot 2x = \frac{x}{x^2+y^2+z^2}$

$f_y = \frac{1}{\sqrt{x^2+y^2+z^2}} \cdot \frac{1}{2\sqrt{x^2+y^2+z^2}} \cdot 2y = \frac{y}{x^2+y^2+z^2}$

$f_z = \frac{1}{\sqrt{x^2+y^2+z^2}} \cdot \frac{1}{2\sqrt{x^2+y^2+z^2}} \cdot 2z = \frac{z}{x^2+y^2+z^2}$

$\nabla f(x,y,z) = \left(\frac{x}{x^2+y^2+z^2} ; \frac{y}{x^2+y^2+z^2} ; \frac{z}{x^2+y^2+z^2}\right)$