SOLUCIÓN PARCIAL 2

EJERCICIO #1 B/M

CAMPO VECTORIAL 1: d) $x\hat{\imath}+\hat{\jmath}$ 0.5

CAMPO VECTORIAL 2: c) $\hat{\imath}+2\hat{\jmath}$ 0.5

EJERCICIO #2

$f(x,y) = -\frac{x}{y^2}$ $P(1, 1/2)$

$f(1, 1/2) = -\frac{1}{(1/2)^2} = -\frac{1}{1/4} = -4$

$-\frac{x}{y^2} = -4 \rightarrow \underline{x = 4y^2}$ (Curva de nivel)

0.5

$\nabla f(x,y) = -\frac{1}{y^2}\hat{\imath} + \frac{2x}{y^3}\hat{\jmath}\Big|_{(1,1/2)}$

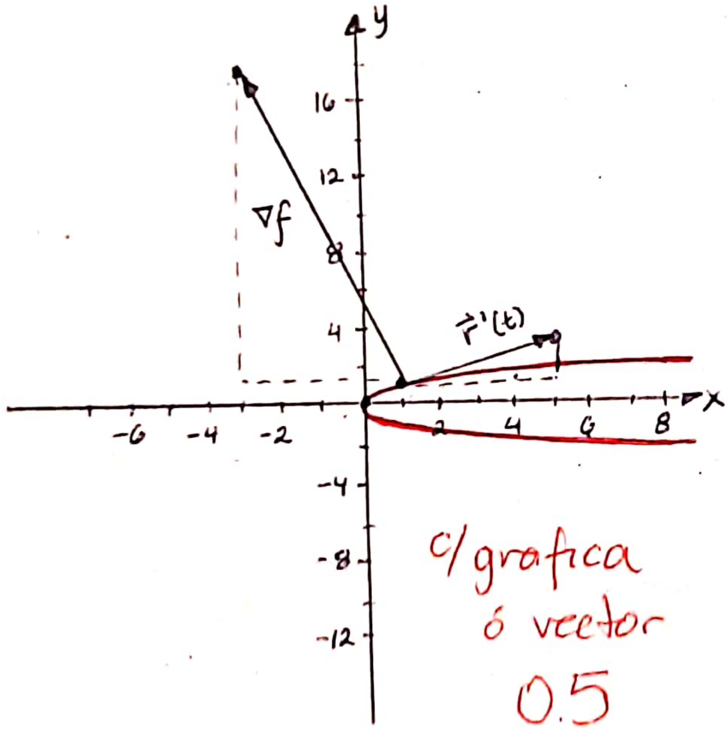
$= -\frac{1}{(1/2)^2}\hat{\imath} + \frac{2(1)}{(1/2)^3}\hat{\jmath} = \underline{-4\hat{\imath}+16\hat{\jmath}}$

0.5

$y = t$, $x = 4t^2$ $\rightarrow$ $\vec{r}(t) = 4t^2\hat{\imath} + t\hat{\jmath}$

$\vec{r}\,'(t) = 8t\hat{\imath} + \hat{\jmath}$

$y = 1/2 = t$ $\underline{\vec{r}\,'(\tfrac{1}{2}) = 4\hat{\imath} + \hat{\jmath}}$ 0.5



c/grafica ó vector

0.5

−0.2 si no expresan ejes, escalas, etc...

EJERCICIO #3

$f = \frac{xy}{z} - \ln(xyz)$

$\nabla f = \left(\frac{y}{z} - \frac{1}{x}\right)\hat{\imath} + \left(\frac{x}{z} - \frac{1}{y}\right)\hat{\jmath} + \left(-\frac{xy}{z^2} - \frac{1}{z}\right)\hat{k}$

$\nabla\times\vec{F} \Rightarrow \vec{F} = \underbrace{yz\ln(x)}_{M}\hat{\imath} + \underbrace{(-xy\ln z)}_{N}\hat{\jmath} + \underbrace{x\ln(y)}_{P}\hat{k}$

$\nabla\times\vec{F} = \left(\frac{x}{y} + \frac{xy}{z}\right)\hat{\imath} + \left(y\ln(x) - \ln(y)\right)\hat{\jmath}$

$+ \left(-y\ln z - z\ln x\right)\hat{k}$

∇f evaluada $\Big|_{(e,e,1)} = \left(e - \frac{1}{e}\right)\hat{\imath} + \left(e - \frac{1}{e}\right)\hat{\jmath}$

Grad 0.5 $+\left(-\frac{e^2}{1} - \frac{1}{1}\right)\hat{k}$

$\nabla\times\vec{F}$ evaluada $\Big|_{(e,e,1)} = (1+e^2)\hat{\imath} + (e-1)\hat{\jmath}$

$+ \left(-e\overset{0}{\cancel{\ln(1)}} - 1\overset{1}{\cancel{\ln(e)}}\right)\hat{k}$ Rot 0.5

$\nabla f + \nabla\times\vec{F}\Big|_{(e,e,1)}$

$= \left(e^2 + e + 1 - e^{-1}\right)\hat{\imath} + \left(2e - 1 - e^{-1}\right)\hat{\jmath}$

$+ \left(-e^2 - 2\right)\hat{k}$ 0.5

$\mu\vec{F} = xy^2z^2\ln(x)\hat{\imath} - x^2y^2z\ln(z)\hat{\jmath} + x^2yz\ln(y)\hat{k}$ 0.5

$\mathrm{Div}\,\mu\vec{F} = y^2z^2\ln(x) + y^2z^2 - 2x^2yz\ln(z) + x^2y\ln(y)$ 0.5

$\mathrm{Div}\,\mu\vec{F}\Big|_{(e,e,1)} = e^2 + e^2 - 0 + e^3 = 2e^2 + e^3$

0.5

$$\vec{G}(x,y,z) = \underbrace{[\ln(3)\ln(yz)3^x - z\sec^2(xz) + 1]}_{M}\hat{i}$$

$$+ \underbrace{\frac{3^x}{y}}_{N}\hat{j} + \underbrace{\left(\frac{3^x}{z} - x\sec^2(xz)\right)}_{P}\hat{k}$$

$$\frac{\partial M}{\partial y} = \frac{\ln(3)\,3^x}{y} \longleftrightarrow \frac{\partial N}{\partial x} = \frac{3^x\ln(3)}{y}$$

0.4

$$\frac{\partial M}{\partial z} = \frac{\ln(3)\,3^x}{z} - \sec^2(xz) - 2xz\sec^2(xz)\tan(xz)$$

0.4

$$\frac{\partial P}{\partial x} = \frac{3^x\ln(3)}{z} - \sec^2(xz) - 2xz\sec^2(xz)\tan(xz)$$

0.2

$$\frac{\partial N}{\partial z} = 0 \longleftrightarrow \frac{\partial P}{\partial y} = 0$$

$\therefore \vec{G}(x,y,z)$ es conservativo.

$$\int \ln(3)\ln(yz)\,3^x\,dx = \frac{\cancel{\ln(3)}\ln(yz)\cdot 3^x}{\cancel{\ln(3)}} + C(y,z)$$

0.4

$$\int -z\sec^2(xz) + 1\,dx = -\tan(xz) + x$$

$$\int \frac{3^x}{y}\,dy = 3^x\ln(y) + C(x,z)$$ 0.2

$$\int \frac{3^x}{z} - x\sec^2(xz)\,dz = 3^x\ln(z) - \tan(xz) + C(x,y)$$

0.4

$$3^x\ln(yz) = 3^x\ln(y) + 3^x\ln(z)$$

$$g(x,y,z) = \underbrace{3^x\ln(yz) - \tan(xz) + x + C}$$

Simplificada: 1.0

Sin simplificar: 0.5

−0.1 por cada +C omitida...