dérivées partielles d'ordre 2

$$\frac{\partial^2 f}{\partial x^2} = \frac{\partial}{\partial x}\left(\frac{\partial f}{\partial x}\right) = \frac{\partial}{\partial x}\left(-y\sin(xy)\right)$$
$$= -y^2\cos(xy)$$

$$\frac{\partial^2 f}{\partial y^2} = \frac{\partial}{\partial y}\left(\frac{\partial f}{\partial y}\right) = \frac{\partial}{\partial y}\left(-x\sin(xy)\right)$$
$$= -x^2\cos(xy)$$

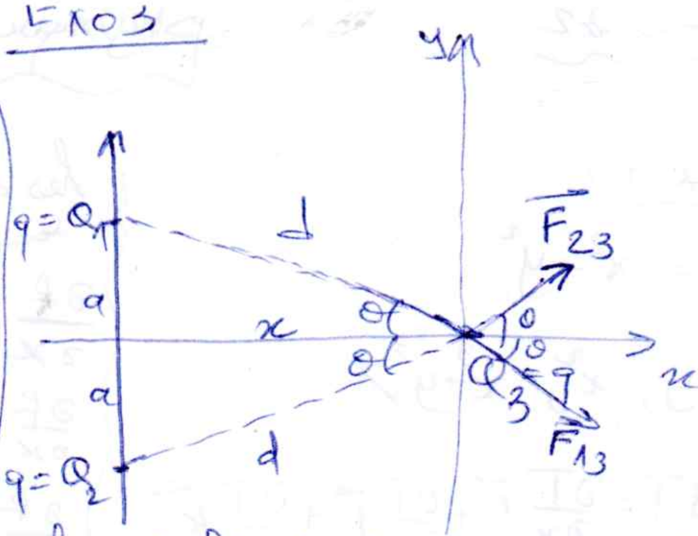
$$\frac{\partial^2 f}{\partial x\partial y} = \frac{\partial}{\partial x}\left(\frac{\partial f}{\partial y}\right) = \frac{\partial}{\partial x}\left(-x\sin(xy)\right)$$
$$= -\sin(xy) - yx\cos(xy)$$

$$\frac{\partial^2 f}{\partial y\partial x} = \frac{\partial}{\partial y}\left(\frac{\partial f}{\partial x}\right) = \frac{\partial}{\partial y}\left(-y\sin(xy)\right)$$
$$= -\sin(xy) - xy\cos(xy)$$

Champs et forces

électrostatiques

Exo3



* La résultante des forces qui s'applique à la charge Q_3

$$\vec{F}_3 = \vec{F}_{13} + \vec{F}_{23}$$

$$\vec{F}_{13} = F_{13}(\cos\theta\,\vec{i} - \sin\theta\,\vec{j})$$

$$\vec{F}_{13} = \frac{Kq^2}{d^2}(\cos\theta\,\vec{i} - \sin\theta\,\vec{j})$$

$$\vec{F}_{23} = F_{23}(\cos\theta\,\vec{i} + \sin\theta\,\vec{j})$$
$$= \frac{Kq^2}{d^2}(\cos\theta\,\vec{i} + \sin\theta\,\vec{j})$$

Donc : $\vec{F}_3 = 2\frac{Kq^2}{d^2}\cos\theta\,\vec{i}$

on a : $d = \sqrt{a^2+x^2}$

et : $\cos\theta = \frac{x}{d} = \frac{x}{\sqrt{a^2+x^2}}$

$$\Rightarrow \vec{F}_3 = \frac{2Kq^2}{(a^2+x^2)} \cdot \frac{x}{\sqrt{a^2+x^2}}\,\vec{i}$$

$$\vec{F}_3 = \frac{2Kq^2 x}{(a^2+x^2)^{\frac{3}{2}}}\,\vec{i}$$

$$\|\vec{F}_3\| = \frac{2Kq^2 x}{(a^2+x^2)^{\frac{3}{2}}}$$

2)