croisement de E_x et E_y :

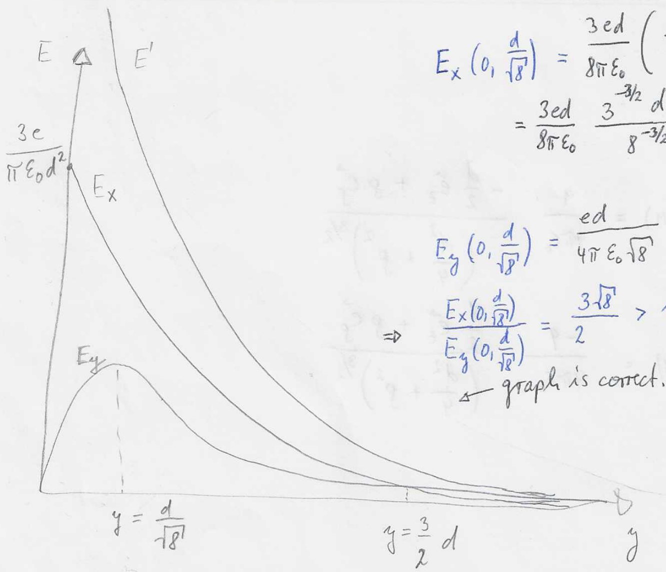
$$E_x = E_y$$

$$\Leftrightarrow \frac{3\cancel{e}d}{8\cancel{\pi}\cancel{\varepsilon_0}} \cancel{\left(\frac{d^2}{4}+y^2\right)^{-3/2}} = \frac{\cancel{e}y}{4\cancel{\pi}\cancel{\varepsilon_0}} \cancel{\left(\frac{d^2}{4}+y^2\right)^{-3/2}}$$

$$\Leftrightarrow \frac{3d}{8} = \frac{y}{4}$$

$$\Leftrightarrow \boxed{y = \frac{3}{2} d}$$

Donc meilleur graphe :



$$E_x\left(0, \frac{d}{\sqrt{8}}\right) = \frac{3ed}{8\pi\varepsilon_0}\left(\frac{d^2}{4}+\frac{d^2}{8}\right)^{-3/2}$$

$$= \frac{3ed}{8\pi\varepsilon_0} \frac{3^{-3/2} d^{-3}}{8^{-3/2}}$$

$$E_y\left(0, \frac{d}{\sqrt{8}}\right) = \frac{ed}{4\pi\varepsilon_0\sqrt{8}} \frac{3^{-3/2} d^{-3}}{8^{-3/2}}$$

$$\Rightarrow \frac{E_x(0,\frac{d}{\sqrt{8}})}{E_y(0,\frac{d}{\sqrt{8}})} = \frac{3\sqrt{8}}{2} > 1$$

← graph is correct.

$$E'\left(0, \frac{d}{\sqrt{8}}\right) = \frac{e}{4\pi\varepsilon_0}\frac{8}{d^2} = \frac{2e}{\pi\varepsilon_0 d^2}$$

$$\frac{E'(0,\frac{d}{\sqrt{8}})}{E_x(0,\frac{d}{\sqrt{8}})} = \frac{2\cancel{e}\cdot 8\cancel{\pi}\cancel{\varepsilon_0}\cancel{d^3}}{\cancel{\pi}\cancel{\varepsilon_0}\cancel{d^2}\cdot 3\cancel{ed}}\cdot\frac{3^{3/2}}{8^{3/2}} = \frac{16\cdot 3^{3/2}}{3\cdot 8^{3/2}} = \frac{2}{\sqrt{8}}\cdot\sqrt{3} \approx 1{,}225 > 1$$

ok.!

$$4^{3/2} = \sqrt{64} = 8 \qquad (d^2)^{3/2} = d^3$$

$$\frac{d}{dy} E_y(y) = \frac{e}{4\pi\varepsilon_0}\left(\frac{d^2}{4}+y^2\right)^{-3/2} - \frac{3}{\cancel{2}} \frac{e y}{4\pi\varepsilon_0}\left(\frac{d^2}{4}+y^2\right)^{-5/2} \cdot \cancel{2} y$$

$$= \frac{e}{4\pi\varepsilon_0}\left[\left(\frac{d^2}{4}+y^2\right)^{-3/2} - 3y^2\left(\frac{d^2}{4}+y^2\right)^{-5/2}\right] \stackrel{!}{=} 0$$

$$\Rightarrow \left(\frac{d^2}{4}+y^2\right) - 3y^2 = 0 \quad \Leftrightarrow \quad y^2 = \frac{d^2}{8}$$

$$y = \sqrt{\frac{d^2}{8}} = \frac{d}{\sqrt{8}}$$