

2. Una carga  $5 \text{ nC}$  en  $(r, \varphi, z) = (2, 115, 4)$

a)  $\vec{E}$  en  $(4, -2, 4)$  en rectangulares

$$(r, \varphi, z) = (2, 115, 4)$$

$$\tan(115) = \frac{y}{x}$$

$$-2,14 = \frac{y}{x} \rightarrow -2,14x = y$$

$$-2,14 \cdot 0,85 = y$$

$$-1,8 = y$$

$$r = \sqrt{x^2 + y^2}$$

$$\tan \theta = \frac{y}{x}$$

$$z = z$$

$$2^2 = x^2 + y^2$$

$$4 = x^2 + (-2,14x)^2$$

$$4 = x^2 + 4,6x^2$$

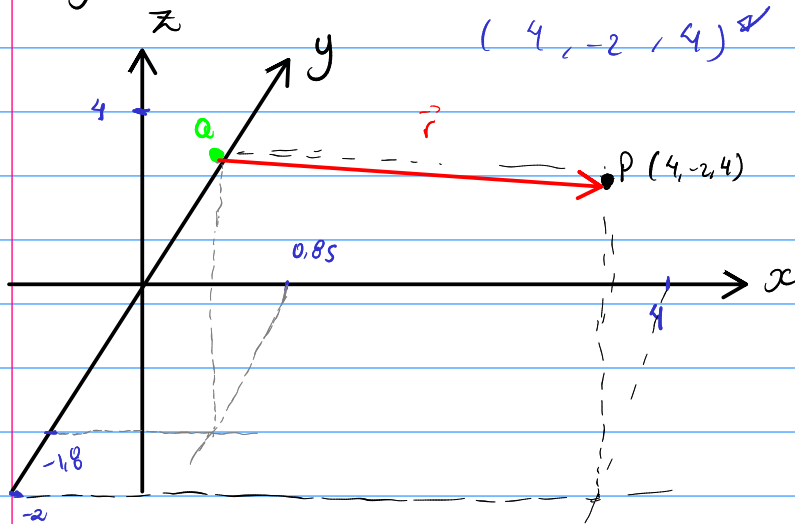
$$4 = 5,6x^2$$

$$\frac{4}{5,6} = x^2$$

$$\sqrt{\frac{4}{5,6}} = x = 0,85$$

Carga esta  $(x, y, z) = (0,85, -1,8, 4)$

$(4, -2, 4)$



$$\vec{E} = k \cdot \frac{Q}{r^3} \vec{r} \rightarrow \frac{kQ}{r^2} \hat{r}$$

$$\vec{r} = (4 - 0,85, -2 - (-1,8), 4 - 4)$$

$$\vec{r} = (3,15, -0,2, 0)$$

$$\vec{r} = 3,15 a_x - 0,2 a_y + 0 a_z$$

$$r = \sqrt{(3,15)^2 + (-0,2)^2}$$

$$r = 3,16$$

$$\vec{E} = k \cdot \frac{Q}{r^3} \vec{r}$$

$Q =$

$$\vec{E} = 1,43 \times 10^{-18} (3,15 a_x - 0,2 a_y)$$

$$\vec{E} = k \cdot \frac{5 \text{ nC}}{(3,16)^3} \cdot (3,15 a_x - 0,2 a_y)$$

$$\vec{E} = 4,49 \times 10^{-18} a_x - 285 \times 10^{-21} a_y$$

b) Determine la Fuerza de una carga  $-15nC$  en  $(4, -2, 4)$  en cilíndricas

$$F = ?$$

$$F = K \frac{Q_1 Q_2}{r^3} \vec{r}$$

$$\Rightarrow F = q \cdot \vec{E}$$

$$\vec{F} = (-15nC) \cdot (4,49 \times 10^{-18} a_x - 285 \times 10^{-21} a_y)$$

$$\vec{F} = \underbrace{-67,4 \times 10^{-27}}_{A_x} a_x + \underbrace{4,28 \times 10^{-27}}_{A_y} a_y$$

$$(x, y, z) \rightarrow (r, \phi, z)$$

$$\rightarrow (A_x \cos \phi + A_y \sin \phi) a_r$$

$$\rightarrow (A_y \cos \phi - A_x \sin \phi) a_\phi$$

$$\rightarrow A_z a_z = 0$$

$$\vec{F}_\theta = (-67,4 \times 10^{-27} \cos(115) + 4,28 \times 10^{-27} \sin(115)) a_r + (4,28 \times 10^{-27} \cos(115) + 67,4 \times 10^{-27} \sin(115)) a_\phi$$

$$\vec{F} = 3,23 \times 10^{-26} a_r + 59,3 \times 10^{-27} a_\phi$$