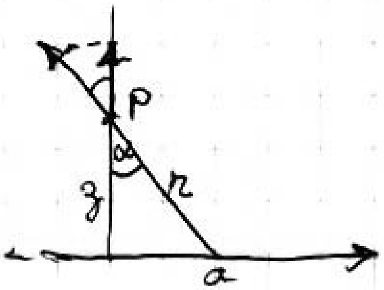
Ejercicio 1. Fecha / Date: 27/03/08

1.-



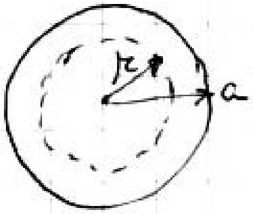
$$E_z = \frac{q}{4\pi\varepsilon_0}\frac{\cos\alpha}{r^2}$$

$$\cos\alpha = \frac{z}{r}$$

$$E_z = \frac{q}{4\pi\varepsilon_0}\frac{z}{r^3}$$

$r = (z^2+a^2)^{1/2}$ $\quad \therefore E_z = \dfrac{q}{4\pi\varepsilon_0}\cdot\dfrac{z}{(z^2+a^2)^{3/2}}$

2.-



a) supongo $0 < r \le a$

Ley de Gauss: $4\pi r^2 E = \dfrac{Q}{\varepsilon_0}$

$$Q = -q + \int_0^r 4\pi r^2 dr\cdot\rho$$

$$Q = -q + \frac{4\pi r^3}{3}\cdot\rho$$

Para encontrar ρ: $\dfrac{4\pi}{3}a^3\cdot\rho = q \therefore \rho = \dfrac{3\cdot q}{4\pi a^3}$

$$\therefore Q = -q + \frac{r^3}{a^3}q = q\left(\frac{r^3}{a^3}-1\right)$$

reemplazando:

$$4\pi r^2 E = \frac{q}{\varepsilon_0}\left(\frac{r^3}{a^3}-1\right)$$

$$E = \frac{q}{4\pi\varepsilon_0}\left(\frac{r}{a^3}-\frac{1}{r^2}\right)$$

Si $r>a$, $Q=0 \therefore E=0$