# Electromagnetics

Homework 2

1- A circular disk of radius a has a nonuniform charge density $\sigma = \sigma_0 \sin^2 \varphi$. Determine E on its axis at z=h .

2- A spherical surface with radius a centered at the origin has a nonuniform charge density $\sigma = \sigma_0 \cos\theta$. Find the electric field on the z axis outside the sphere($z > a$).

3- A truncated cone, as shown in the figure, has a nonuniform surface charge density $\sigma = \sigma_0 \sin\varphi$. Find the electric field at the origin.

$$\begin{cases} a < r < b \\ 0 < \varphi < 2\pi \\ \theta = 30° \end{cases}$$
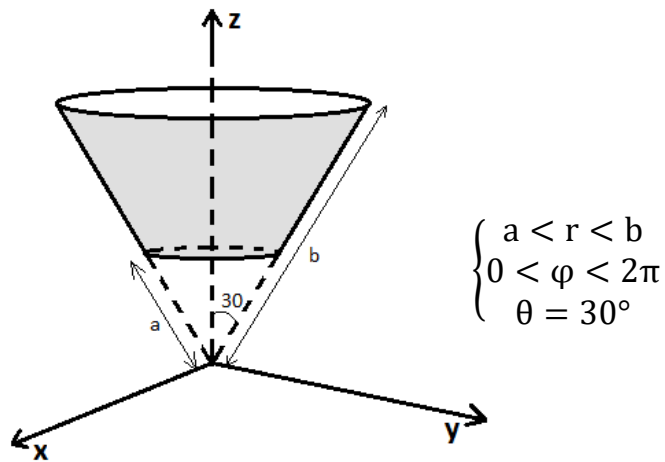
4- Consider a charge density

$$\rho = \begin{cases} \rho_0 \left(1 - \dfrac{r^2}{a^2} \right) & r < a \\ 0 & r > a \end{cases}$$

Find the electric field using the Gauss's law.