Home work due Tuesday March 3

The following problems from chapter 3
of the textbook: 22, 23, 26, 27, plus the
problem below.

Consider a charge distribution $\rho(x, y, z) = \begin{cases} 0, & \text{for } x > a, \\ \rho_0 = \text{constant in } x, & \text{for } |x| < \\ 0, & \text{for } x < -a. \end{cases}$

(a) Assuming symmetry of the electric field about
the plane $x = 0$ (that is, $E_x(x) = -E_x(-x)$),
use Gauss's law to find $E_x(x)$ for $|x| < a$, for
$x > a$, and for $x < -a$. The dielectric constant is
ϵ_0 everywhere.

(b) Now consider the same charge distribution, but with
a spherical hole of radius $a/2$ centered at $(x, y, z) = (0, 0, 0)$
Use the principle of superposition to find the electric field
at the point $x = a/2$, $y = a/2$, $z = 0$.
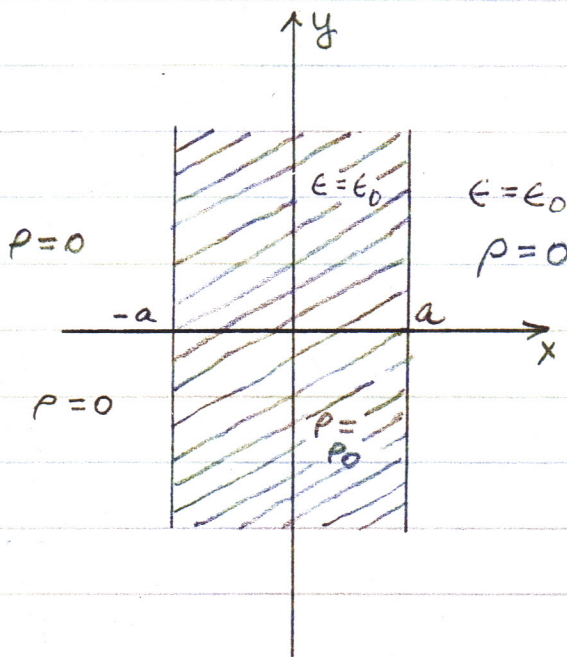
Diagram for part (a)

Diagram for part (b)