A very long solid nonconducting cylinder of radius $R_1$ is uniformly charged with a charge density $\rho_E$. It is surrounded by a concentric cylindrical tube of inner radius $R_2$ and outer radius $R_3$, as shown in the figure below, and it carries a non-uniform charge density $\rho = \frac{\rho_o}{r}$, where $\rho_o$ is a constant and $r$ is the distance from the center of the cylinders. Find the electric field everywhere, i.e.

a. $0 < r < R_1$

b. $R_1 < r < R_2$

b. $R_2 < r < R_3$

d. $R_3 < r$