From Griffiths: 1.41, 1.46, 2.1, 2.6, 2.16

1. An infinite line charge on the z-axis has a density $-\lambda$ for $z < 0$ and $+\lambda$ for $z > 0$. Show that the magnitude of the electric field is $E = \frac{\lambda}{2\pi\epsilon_) s}$.

2. The electrostatic field above the earth's surface has the empirical form $\mathbf{E} = -(ae^{-\alpha z} + be^{-\beta z})\hat{z}$, where a, b, α, and β are constants and z is the altitude above the surface of the earth. Use Gauss's law in differential form to determine the charge density $\rho(z)$. Use Gauss's law in integral form to find the total charge within a column from $z = 0$ to $z = \infty$ with a cross-sectional area of A.

3. Which of the follow wing fields could not be electrostatic? Why?
   (a) $\mathbf{E} = c(x - z)^2(\hat{x} - \hat{z})$
   (b) $\mathbf{E} = kyz\sin(kxy)\hat{x} + kxz\sin(kxy)\hat{y} - \cos(kxy)hatz)$
   (c) $\mathbf{E} = 2xyz\hat{x} + xz^2\hat{y} + x^2y\hat{z}$