From Griffiths: 4.1, 4.3, 4.6, 4.8, 4.9, 4.10, 4.13

1. Show that the electrostatic energy of density when a polarizable material is present is $\frac{1}{2}\vec{\mathbf{E}} \cdot \vec{\mathbf{D}}$. Start with $W = \frac{1}{2} \int \rho_f V \, d\tau$ and follow the derivation in section 2.4.3.

2. A dielectric right cylinder with a length L and radius R is centered at the origin and has a uniform polarization along its axis of $\vec{\mathbf{P}} = P_o \hat{\mathbf{z}}$.

   (a) Calculate the bound charge σ_b and ρ_b.

   (b) Calculate the electric field outside of the cylinder along the axis of the cylinder due to the polarization.