Problem 3) Consider two uniformly-charged slabs having charge-densities $+\rho_0$ and $-\rho_0$, as shown. Let these slabs be superposed, with the center of one slab shifted by d relative to the center of the other. The direction of shift makes an angle θ with the surface-normal. The individual charges are q, the individual dipoles are $p = qd$, and, when multiplied by the number of charges N per unit volume, the polarization density is $P = Np = Nqd = \rho_0 d$. The direction of $\boldsymbol{P}$ coincides with the direction of displacement $\boldsymbol{d}$. Now, the surface charge-density (i.e., charge per unit area) is given by the volume charge-density $\pm\rho_0$ times the thickness of the surface layer $d\cos\theta$. Therefore, $\sigma_s = \rho_0 d\cos\theta = P\cos\theta$.