The $z = 0$ plane is the boundary between two materials: the region of space with $z > 0$ is vacuum, the region with $z < 0$ has $\epsilon = 4\epsilon_0$ and $\mu = 1000\mu_0$. The boundary carries a surface charge density of $\sigma_f = 8.85 \times 10^{-8}$ C/m^2 and a surface current (flowing in the x direction) of $j_f = 10^3$ A/m. On the vacuum side of the boundary $\vec{\mathbf{E}} = 10^3\hat{\mathbf{j}} + 10^4\hat{\mathbf{k}}$ V/m, and $\vec{\mathbf{B}} = -10^{-4}\hat{\mathbf{j}} + 10^{-5}\hat{\mathbf{k}}$ T. Start by making a sketch showing the directions of the $\vec{\mathbf{E}}$ (on both sides) that would result from σ_f in a vacuum. Show on your sketch the direction you are taking for the boundary's normal. Make a sketch showing the direction of $\vec{\mathbf{B}}$ (on both sides) that would result from $\vec{\mathbf{j}}_f$ in a vacuum. Show on your sketch the direction you are taking for the boundary's tangent. Now find $\vec{\mathbf{E}}$ and $\vec{\mathbf{B}}$ inside the material. ($\epsilon_0 = 8.85 \times 10^{-12}$ $\mathrm{C^2/(N \cdot m^2)}$ $\mu_0 = 4\pi \times 10^{-7}$ $\mathrm{N/A^2}$)