

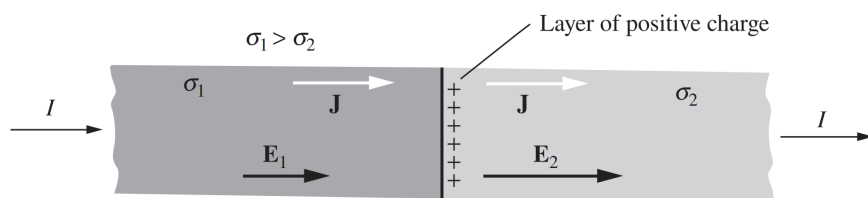
# PHYS UN1602 Recitation Week 5 Worksheet

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## Problem 1

Show that the total amount of charge at the junction of the two materials in the figure below is  $\varepsilon_0 I \left( \frac{1}{\sigma_2} - \frac{1}{\sigma_1} \right)$ , where  $I$  is the current flowing through the junction, and  $\sigma_1$  and  $\sigma_2$  are the conductivities of the two conductors.



## Problem 2

A laminated conductor is made by depositing, alternately, layers of silver 100 angstroms thick and layers of tin 200 angstroms thick (1 angstrom =  $10^{-10}$  m). The composite material, considered on a larger scale, may be considered a homogeneous but anisotropic material with an electrical conductivity  $\sigma_{\perp}$  for currents perpendicular to the planes of the layers, and a different conductivity  $\sigma_{\parallel}$  for currents parallel to that plane. Given that the conductivity of silver is 7.2 times that of tin, find the ratio  $\sigma_{\perp}/\sigma_{\parallel}$ .