$\vec{E} = \sigma \vec{J}$ $\rightarrow$ Electric field 'ε' is proportional through a constant 'σ' and Current density '$\vec{J}$'

$\nabla \cdot \vec{J} = 0$ $\rightarrow$ Electric charge is conserved (constraint)

$\vec{J} \cdot \hat{n} = I/A$ $\rightarrow$ Current density accross a boundary $\hat{n}$ is related to I/A.

$\vec{J} \cdot \hat{n} = 0$ $\rightarrow$ current density ⊥lar to bot is '0'. (No flow of charge accross surface)

$J \rightarrow 0$ as $x \rightarrow \infty$ $\rightarrow$ Curnt denity becomes small as you move away

$\vec{E} = -\nabla \phi$ $\rightarrow$ Electric field is the negative gradient of potential

$\nabla^2 \phi = 0$ $\rightarrow$ Laplace eq for Elec pot, in a region with no charges, Elec pot dosn't vary from point to point.

$\nabla \phi \cdot \hat{n} = \mp I/A\sigma$ $\rightarrow$ accross pads this is how its related

$\nabla \phi \cdot \hat{n} = 0$ $\rightarrow$ Elec Potentil normal to surface is 0, no change in pot accross the surface.