Prob. 1.A) Derive the relationship between the current density $J$ and the applied voltage $V_0$ for a space charge limited flow in a vacuum diode in the ultra relativistic regime, $eV_0 >> mc^2$. (Hint: take the electron speed to be $c$)

Prob. 1B) Consider electrostatics in one dimension; i.e., $\rho = \rho(x)$, and $\Phi = \Phi(x)$. (i) What is the Dirichlet Green’s function for the domain $0 \leq x \leq b$? (ii) What is the one-dimensional analog to Eq. (1.44)