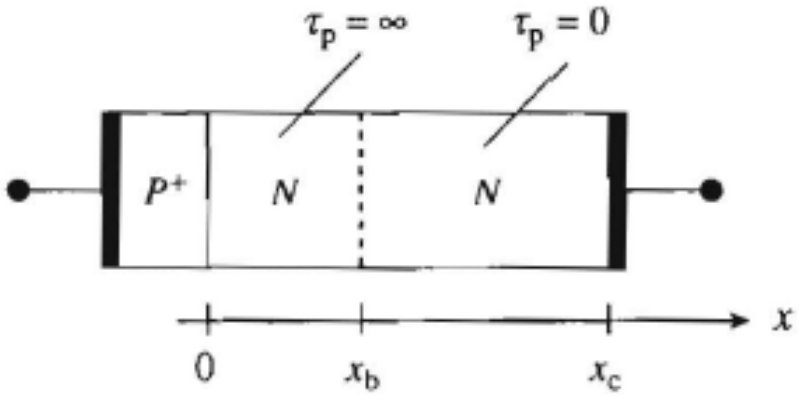
Problem #2:




Consider the $p^+$-n junction pictured above and answer the following:

a. What does the I-V characteristic look like? Can you find an expression for it?

b. How does it change if we make $\tau_p > 0$ from $x_b < x < x_c$?

Problem #3:

The maximum power delivered by a solar cell can be found by maximizing the I-V product.

a. Show that maximizing the power leads to the expression: $\left(1 + \frac{q}{kT} V_{mp}\right) e^{qV_{mp}/kT} = 1 + \frac{I_{sc}}{I_{th}}$ where $V_{mp}$ is the voltage for maximum power, $I_{sc}$ is the magnitude of the short-circuit current, and $I_{th}$ is the thermally induced reverse saturation current.

b. Assume a silicon solar cell with a dark saturation current $I_{th}$ of 1.5 nA is illuminated such that the short-circuit current is $I_{sc}$ = 100 mA. Use a graphical solution to obtain the voltage Vmp at the maximum power delivered.