

4. Transport**Problems**

4.1. A semiconductor has electron mobility $\mu_n = 200 \text{ cm}^2/(\text{V}\cdot\text{s})$. At a particular point, the electron density is $n = 4.5 \times 10^{17} \text{ cm}^{-3}$ and the electron quasi-Fermi level has slope $dE_{F_n}/dx = 0.083 \text{ eV/cm}$.

- a) Find the electron current J_n at this point. (Recall that $1 \text{ V} = 1 \text{ J/C}$.)
 - b) Assume the current arises from *drift* only. Find the electric field E at this point:
 - c) Assume instead that the current arises from *diffusion* only. (Hint: Use the Einstein relation.) Find the concentration gradient dn/dx (in cm^{-4})
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