EE 230 — HW 4.2 Name_____

Calculate the diffusion current density for the following carrier distributions. For electrons, use $D_n = 35$ cm^2/s and for holes, use $D_p = 10$ cm^2/s.

a. $n(x) = \left(10^{10}\,\text{cm}^{-3}\right)\dfrac{5\,\mu\text{m} - x}{5\,\mu\text{m}}$; J_n = _____

b. $p(x) = \left(10^{10}\,\text{cm}^{-3}\right)\exp\left(-\dfrac{x}{2\,\mu\text{m}}\right)$, at $x = 0$: $J_p(0)$ = _____

c. $p(x) = \left(10^{10}\,\text{cm}^{-3}\right)\exp\left(-\dfrac{x}{2\,\mu\text{m}}\right)$, at $x = 2.5\,\mu$m:

$J_p(2.5\,\mu\text{m})$ = _____

d. $p(x) = \left(10^{10}\,\text{cm}^{-3}\right)\exp\left(-\dfrac{x}{2\,\mu\text{m}}\right)$, at $x = 20\,\mu$m:

$J_p(20\,\mu\text{m})$ = _____

e. $n(x) = \left(10^{10}\,\text{cm}^{-3}\right)\dfrac{5\,\mu\text{m}}{\sqrt{x^2 + \left(5\,\mu\text{m}\right)^2}}$, at $x = 5\,\mu$m:

$J_n(5\,\mu\text{m})$ = _____