ECE 3040 Homework 4

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5

5(a)

$$\sigma = q\mu_n n + q\mu_p p$$

$$= q\mu_n n + q\mu_p \frac{n_i^2}{n}$$

$$3\text{E}-6$$

$$s\boldsymbol{I} - \boldsymbol{A} = \begin{pmatrix} s & 3 \\ -3 & s+5 \end{pmatrix}$$

$$\left. \begin{matrix} \mu_n \\ \mu_p \end{matrix} \right\} \propto T^{-3/2}$$

$$\sigma = q \cdot \left(n\alpha T^{-3/2} + p\beta T^{-3/2} \right) \tag{1}$$

$$n = N_c e^{\frac{-\left(E_c - E_f\right)}{kT}} \tag{2}$$

$$N_c = 2\left(\frac{m_n^* kT}{2\pi\hbar^2}\right)^{\frac{3}{2}} \tag{3}$$

$$p = N_v e^{\frac{E_v - E_f}{kT}} \tag{4}$$

$$N_v = 2\left(\frac{m_p^* kT}{2\pi\hbar^2}\right)^{\frac{3}{2}} \tag{5}$$

Plugging in (2), (3), (4), and (5) into (1), the resulting expression for σ will vary with $e^{-1/T}$.

$$\boxed{\mathcal{E} = -\frac{kt}{qx}}$$

1