Physics 492 Homework 3:

1. (5 pts) Show that the factor \[ \frac{m_e}{2\pi\hbar^2} k \left| \int \frac{d^3u \cdot \exp(-i\vec{q} \cdot \vec{u} / \hbar)}{u} \right|^2 \] is equal to \[ \frac{d\sigma}{d\Omega_{Roth}}. \] (Hint: Replace \( \int \frac{d^3u \cdot \exp(-i\vec{q} \cdot \vec{u} / \hbar)}{u} \) by \( \lim_{\delta \to 0} \int \frac{d^3u \cdot \exp(-i\vec{q} \cdot \vec{u} / \hbar - \delta u)}{u} \), do the integral and then take the limit.)

2. (5 pts) Problem 3.1 from Williams.

3. (4 pts) Problem 3.2 from Williams.

4. (4 pts) Problem 3.6 from Williams

5. (7 pts) Problem 3.7 from Williams.