Physics 492 Homework 1:

1. (5 pts) Problem 1.1 from Williams.
2. (2 pts) Problem 1.3 from Williams.
3. (4 pts) Problem 1.4 from Williams.
4. (3 pts) Problem 1.6 from Williams.

5. (4 pts) Experimenters measured the differential cross section for elastic scattering between $^{16}$O projectile and a $^{28}$Si target nuclei, which is plotted to the right as the ratio over the Rutherford differential cross section. Assume that the relationship between the scattering angle for Coulomb scattering is approximately valid for small angles when
   \[ \frac{\sigma(\theta)}{\sigma_R(\theta)} > 0.1 \]
   though the nuclear interaction is acting between the two nuclei.
   a) What is the minimum distance between the two nuclei (often called the strong absorption radius, $R_s$) when
   \[ \frac{\sigma(\theta)}{\sigma_R(\theta)} = 0.25 \]?
   b) Assuming that $R_s = R_O + R_{Si}$ and that the radius of each nucleus is related to its nucleon number $A$ by $R = r_0 A^{1/3}$. Find the constant $r_0$. (Note: $A=16$ for $^{16}$O and $A=28$ for $^{28}$Si)