449 HW #6

1) T 13.4 [4]

2) T 13.7

3) T 13.12 [2]

4-5) By numerical integration of the Schrodinger equation, find the s-wave scattering length and the s-wave cross section as a function of energy for an electron scattering from the potential

$V(r) = \frac{-V_0}{1+(r/b)^4}$

for $V_0 =$ 9.5 eV, $b = 2\,a_0$. Plot your results from 0 to 10 eV, on a log scale. From your zero energy wavefunction, how many bound states are there in this potential?

6) Find the equation that must be satisfied by the function $G(r, r')$ in order that

$\psi_k(\bar{r}) = \psi_k^0(\bar{r}) + \frac{2\mu}{\hbar^2} \int d^3\bar{r}'\, G(\bar{r}, \bar{r}')\, V(\bar{r}')\, \psi_k(\bar{r}')$

solve the Schrödinger equation for a particle of mass μ and energy $E = \frac{\hbar^2 k^2}{2\mu}$.

$\psi_k^0(\bar{r})$ is a solution to the Schrödinger equation when $V = 0$.