

PHY 251 Fall 2009: homework problem set 7, due in the PHY 251 drop box in room A-129 by noon on Friday, Oct. 30.

1. Serway 6.15
2. Serway 6.16
3. An electron is in a finite square well of width $L = 0.5$ nm and $U = 10.0$ eV. Calculate the characteristic tunneling distance δ , and calculate the energy of the ground state both in the approximation that $U \rightarrow \infty$ and with $U = 10.0$ eV.
4. Look at Serway problem 6.23 again. Setting $L = 0.6$ nm, and $U = 5.0$ eV, find an approximate numerical result in eV for the energies of the first two quantum states, and find numerical values in nanometers for $1/k$ and $1/\alpha$ in the ground state.
5. Serway 6.28
6. 6.33
7. A 100 kg person is moving at a slow speed of 0.1 meters per second. What is the likelihood that they will tunnel through a 2 nanometer thick barrier, 2 meters tall? (Use mgh for the potential energy). If they try to pass through the wall once per second, will they likely tunnel through the wall over the 13 billion year lifetime of the universe?