

## Physics 3310 Quantum Physics Fall 2009 - Problem Set 8

Due Friday, November 13

1. Problem 5.19
2. Problem 5.21
3. Problem 5.27
4. Consider an electron with kinetic energy  $E = 1.0$  eV which approaches a potential energy barrier of width  $a = 0.3$  nm and height  $U_0 = 4.0$  eV. Calculate the value of the tunneling probability  $T$  that the particle tunnels through the barrier. Use the approximate formula  $T \simeq \exp(-2k_1 a)$  where  $k_1 = \sqrt{2m(U_0 - E)/\hbar^2}$  is the wave-vector of the electron approaching the potential barrier.
5. Honors: Problem 5.25

Note: To normalize wavefunction use  $\int_{-\infty}^{\infty} du u^2 e^{-u^2} = \sqrt{\pi}/2$ .