Physics 5382 Professor Scalise
Homework Assignment #7 Fall 2015

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1. Read Griffiths sections 3-5 and 3-6. Did you read all the pages?

2. Consider the double delta-function potential wells in one dimension:

$$V(x) = -\alpha[\delta(x-b) + \delta(x+b)]$$

   where α and b are positive real constants.

   (a) Sketch the potential.

   (b) Does this potential have any bound states? If so, how many? Does your answer depend on the strength α?

   (c) Is the parity of the wavefunction(s) even or odd?

   (d) Sketch any bound-state wavefunctions.

3. The textbook on page 82 finds the transmission coefficient T for a finite square-well potential and plots T versus E, the energy of the wavefunction. Do the same for the rectangular barrier potential:

$$V(x) = \begin{cases} +V_0, & -a \le x \le a \\ 0, & \text{elsewhere} \end{cases}$$

   in the three cases:

   (a) $E < V_0$, where tunneling will occur.

   (b) $E = V_0$, where you need to solve the Schrödinger equation for the region $-a \le x \le a$ [$\psi(x)$ is neither sine nor sinh].

   (c) $E > V_0$, which is *very* similar to the rectangular well.

Bonus:

Find the reflection coefficient R for the double delta-function well potential above.