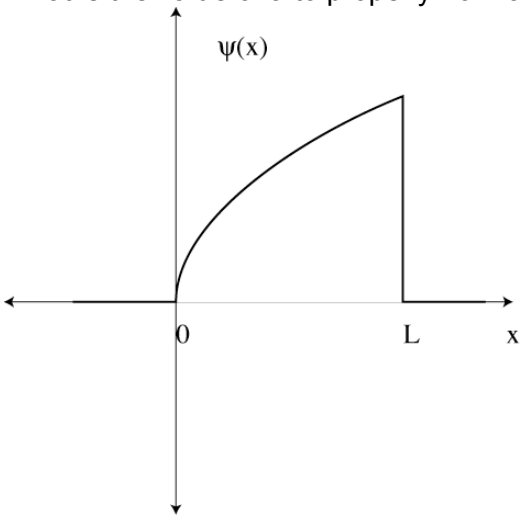
Physics 262 Fall 2010 Practice Exam #6

1&2. A wavefunction for a particle is shown:

$\psi(x) = a\sqrt{x}$, for 0<x<L. L=0.01 m.

What is the value of a to properly normalize this wavefunction? (in m^{-1})



3&4. What is the probability the particle will be found between 0 and L/2 ?

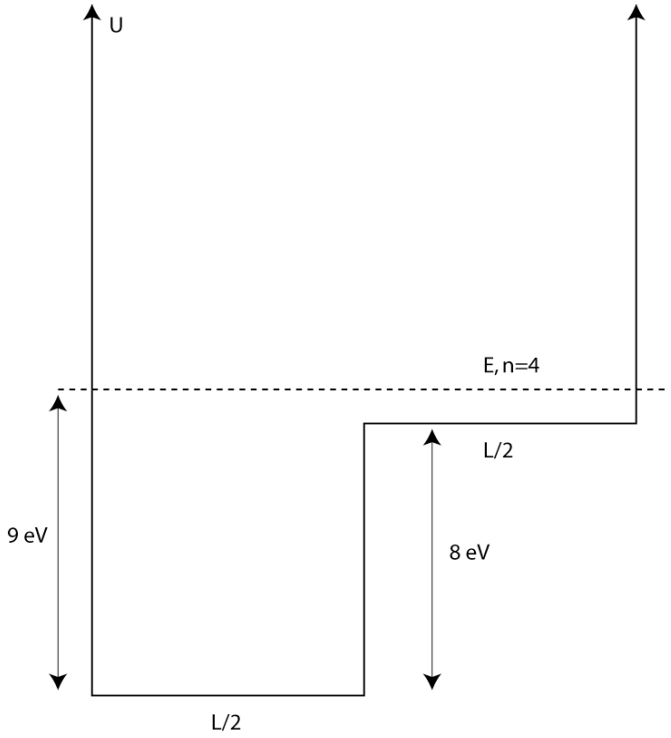
5&6]. A particle is in the mixed wavefunction $\psi = a(0.3\psi_1 + 0.1\psi_2)$, where ψ_1 and ψ_2 are properly normalized stationary states of the potential.
What is a, for proper normalization of the mixed wave?

7&8] What is the probability that the particle will be observed in state ψ_1 ?

---

9. (3 pts) For the infinite potential well shown (next page), sketch as accurately as you can the n=4 quantum state, with energy 9 eV.

10. (3 pts) Sketch the n=2 quantum state. What is its energy, approximately?



---

11. (1 pt) Draw the n=3 Bohr wave on the orbit below.

12&13. Suppose h were 10^{-10} Js. What would be the radius of the orbit in angstroms?

Recall $F = \frac{mv^2}{r} = \frac{1}{4\pi\varepsilon_0}\frac{e^2}{r^2}$