

1. Friday and Saturday tutorials in VI 429
2. Friday's class rescheduled to a later date - TBA

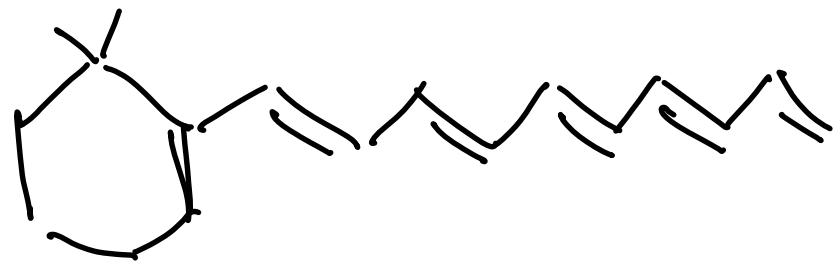
web.mit.edu/~nkurur

1. You are no longer in high school.
2. Expect to have material discussed at / two to three/ times the pace of high school. Above that, we aim for greater command of the material, esp. the ability to apply what you have learned to new situations.
3. You cannot be "taught" everything in the classroom. * It is / your/ responsibility to learn the material. * Most of this learning must take place *outside* the classroom.
4. The instructor's job is primarily to provide a framework to guide you in your learning of the concepts and methods that comprise the material of the course.
5. You are expected to read the textbook for comprehension. The textbook is not a novel, so the reading must often be careful.
6. Read the appropriate section(s) of the book before the material is presented in lecture.
7. Exams will consist largely of fresh problems falling within the material that is being tested.

Particle in an infinite well

Note Title

12-01-2011



carotene

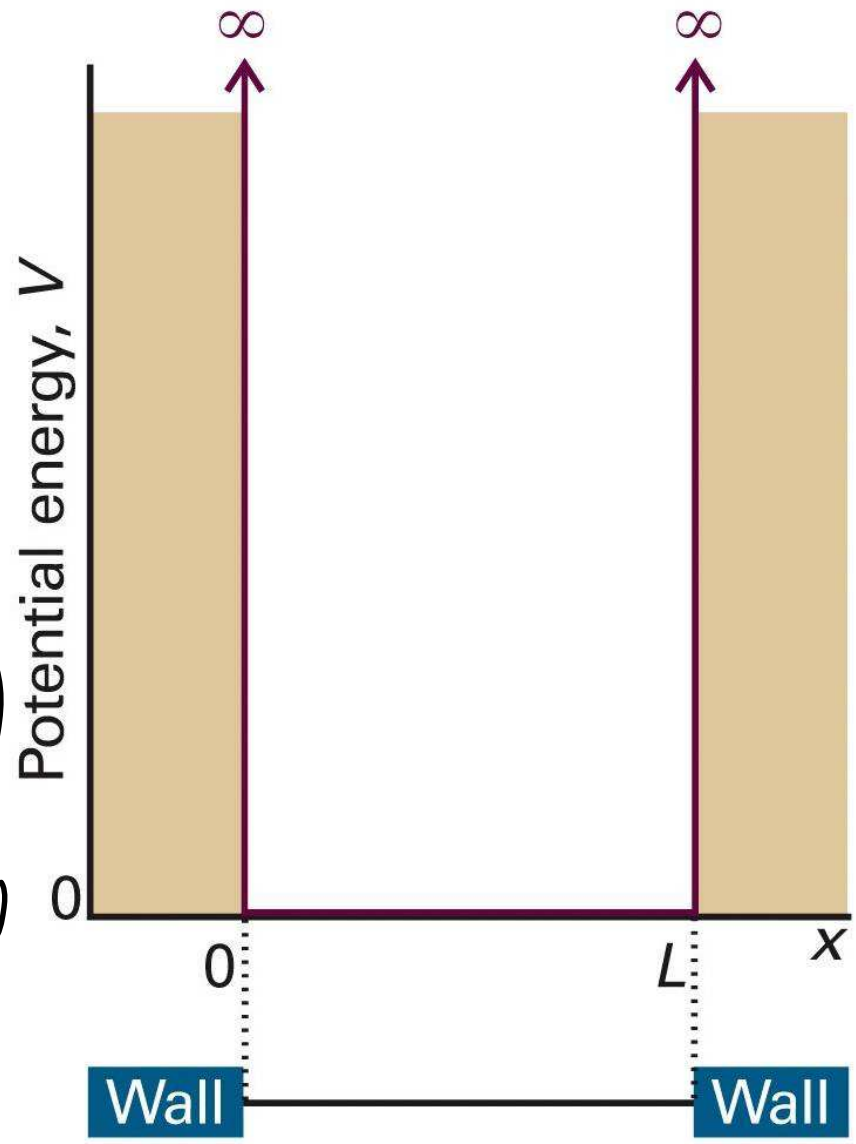
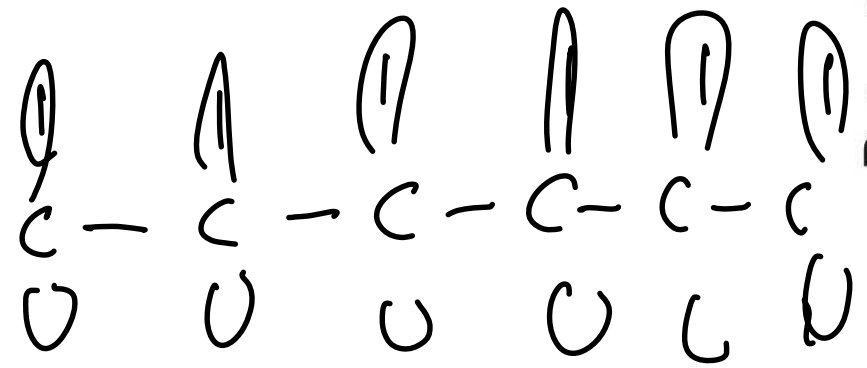
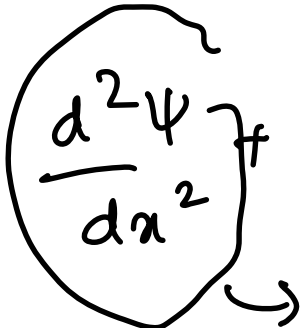


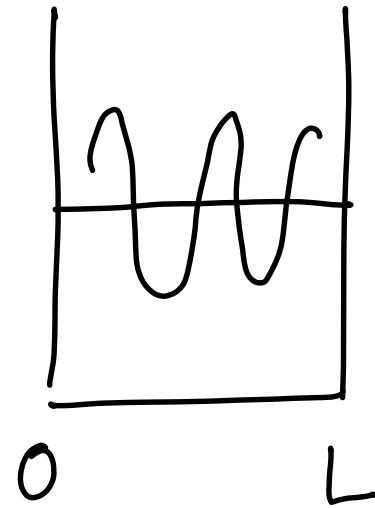
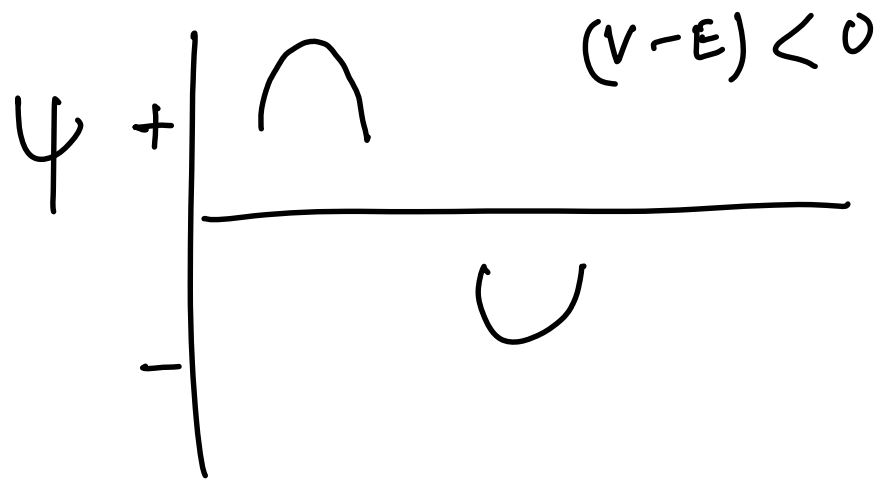
Figure 9-1
Atkins Physical Chemistry, Eighth Edition
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$$\begin{array}{l} \text{Regions I \& II} : \\ \text{Region III} : \end{array} \left. \begin{array}{l} -\frac{\hbar^2}{2m} \frac{d^2}{dx^2} + \infty \\ -\frac{\hbar^2}{2m} \frac{d^2}{dx^2} \end{array} \right\}$$

$$-\frac{\hbar^2}{2m} \left(\frac{d^2 \psi}{dx^2} \right) + V(x) \psi = E \psi$$


 curvature

$$\frac{d^2 \psi}{dx^2} = \frac{2m}{\hbar^2} (V - E) \times \psi$$



Regions I & III:

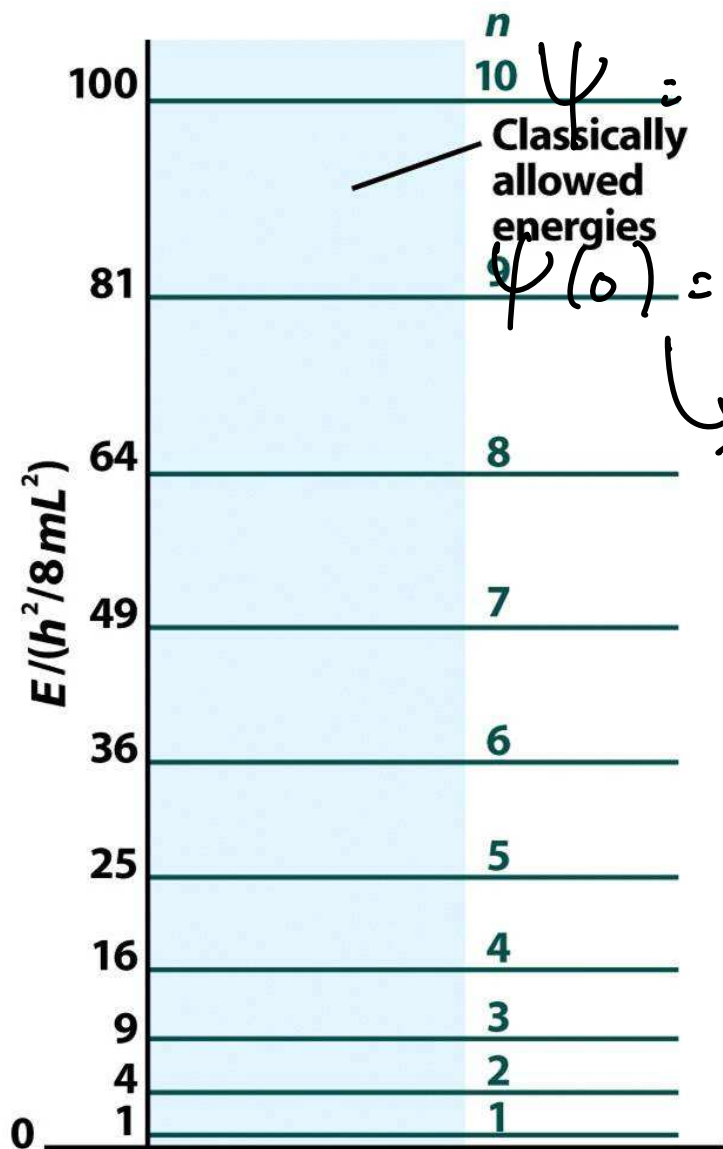
$\psi = 0$ because $V = \infty$

Region II

$$\frac{d^2\psi}{dx^2} + \frac{2mE}{\hbar^2} \psi = 0$$

$$\frac{d^2\psi}{dx^2} + k^2 \psi = 0$$

$$k = \sqrt{\frac{2mE}{\hbar^2}}$$



$$\psi = A \sin kx + B \cos kx$$

Classically allowed energies

$$\psi(0) = 0,$$

$$\psi(L) = 0$$

$$\Rightarrow B = 0$$

$$kx = n\pi$$

$$k = \sqrt{\frac{2mE}{\hbar^2}}$$

$$E_n = \frac{n^2 \hbar^2}{8mL^2}$$

Figure 9-2
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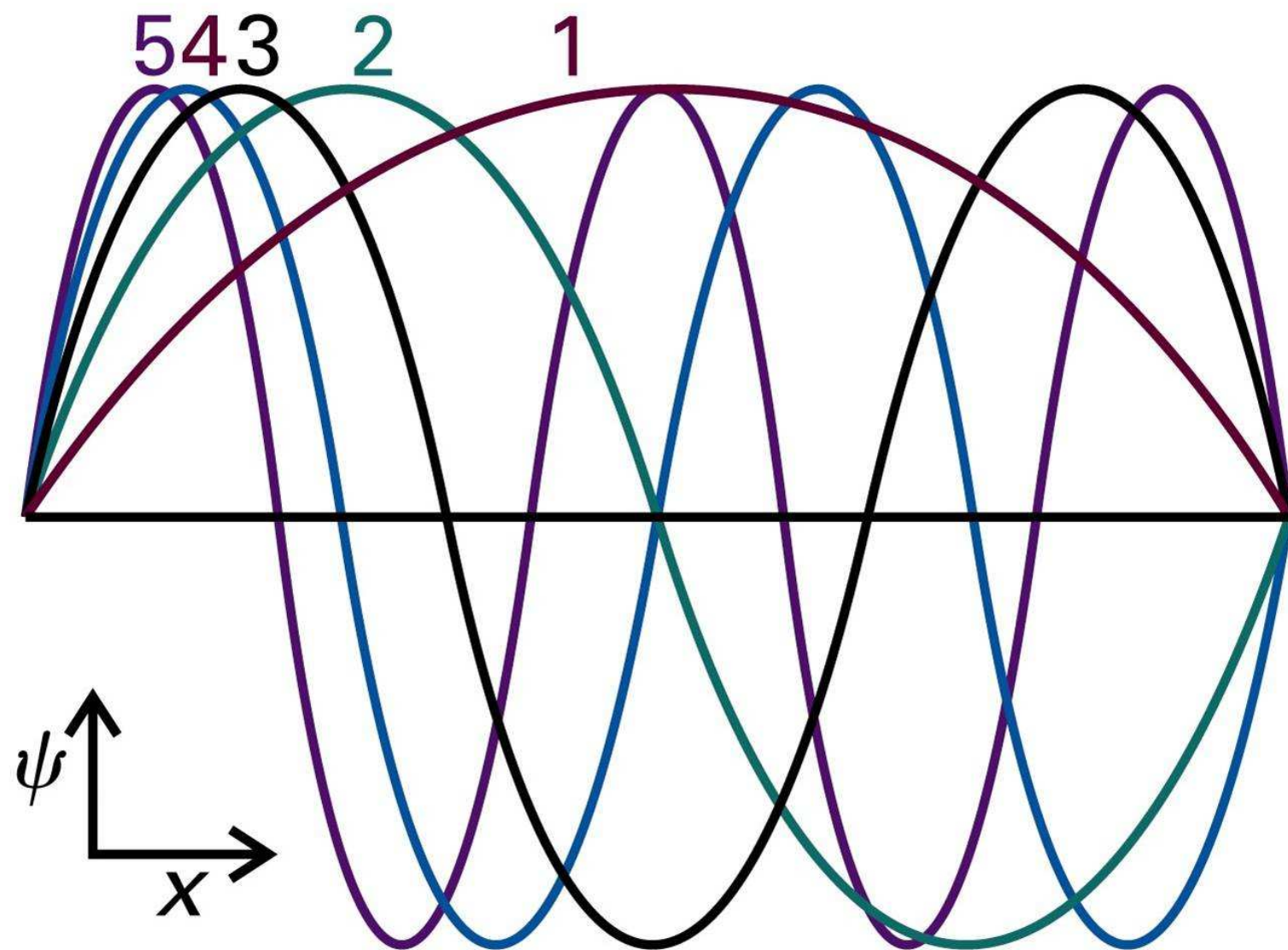


Figure 9-3
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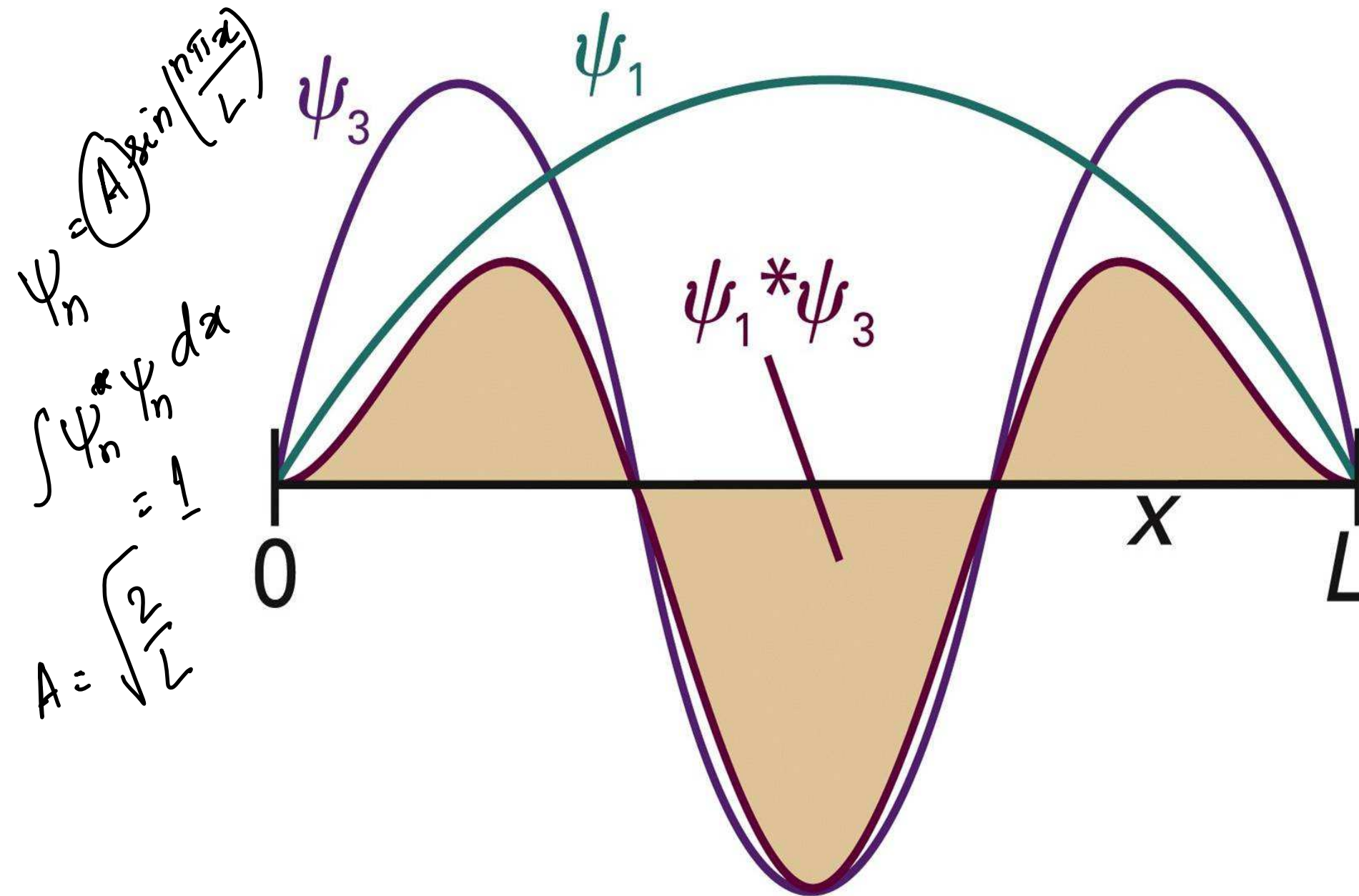


Figure 9-5
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$$\int_0^L \psi_1^* \psi_3 dx = 0 \quad \text{scalar product}$$

In general, $\int \psi_i^* \psi_j dx = 0$

$$\int \psi_i^* \psi_i dx = 1$$

$\delta_{ij} = 0$ if $i \neq j$
 $\delta_{ij} = 1$ if $i = j$

$$\int \psi_i^* \psi_j dx = \delta_{ij}$$

$$\Psi_{(1)} \quad n=1$$

What is the result obtained when the position of a particle in the Ψ_1 state is measured?

$$\begin{aligned} \langle x \rangle_{\Psi_1} &= \int_0^L \Psi_1^* x \Psi_1 dx \\ &= \frac{2}{L} \int_0^L \sin^2 \frac{\pi x}{L} x dx \\ &= L/2 \end{aligned}$$