

and which are a solution of the vibration equation and, in addition, satisfy the boundary conditions, are called **eigenfunctions** of the differential equation.

In Section 2 we related the product $\psi\psi^*$ (which is called the “**norm**”) to the probability of finding a particle at a given location. The probability of finding a particle somewhere in space is *one*, or

$$\int \psi\psi^* d\tau = \int |\psi|^2 d\tau = 1. \quad (3.15)$$

Equation (3.15) is called the normalized eigenfunction.

Problems

1. Write a mathematical expression for a vibration (vibrating string, for example) and for a wave. (See Appendix 1.) Familiarize yourself with the way these differential equations are solved. What is a “trial solution?” What is a boundary condition?
2. Define the terms “vibration” and “wave”.
3. What is the difference between a damped and an undamped vibration? Write the appropriate equations.
4. What is the complex conjugate function of:
 - (a) $\hat{x} = a + bi$; and
 - (b) $\Psi = 2Ai \sin \alpha x$.