

Homework #6

Due 12/12/2001

1. The problem of finding out the coefficient of the amplitude of the finite potential that I assigned in class.

2. At $t=0$, a particle is known to be localized in the left side of a infinite potential well with

sides at $x=\pm a/2$, with the wave function
$$\psi(x) = \begin{cases} \sqrt{\frac{2}{a}}, & -\frac{a}{2} < x < 0 \\ 0, & 0 < x < \frac{a}{2} \end{cases}$$

(a) Calculate the probability that an energy measurement yields the ground state; the energy of the first excited state.

(b) What is the probability that the particle will be found in the right half at time $t>0$?

3. The wave function for a particle is given by $\psi(x) = Ae^{ikx} + Be^{-ikx}$. Calculate the

flux
$$j(x) = \frac{\hbar}{2im} \left[\psi^*(x) \frac{d\psi(x)}{dx} - \frac{d\psi^*(x)}{dx} \right]$$
 of $\psi(x)$. What is the physical interpretation of

it?