

# Solution

Consider a particle in an infinite square well. At  $t = 0$  it is in the state:

$$\Psi(x, t) = 0.5\psi_2(x) + A_2\psi_4(x)$$

with  $\psi_2(x)$  and  $\psi_4(x)$  both normalized.

1. What is  $A_2$ ?   a. 0.5   b. 0.707   **c. 0.866**

As stated, the question is ambiguous.  $A_2$  could be complex. However, let's assume that  $A_2$  is real.

We are told that  $\psi_2(x)$  and  $\psi_4(x)$  are both normalized.

Therefore:  $0.5^2 + |A_2|^2 = 1 \Rightarrow |A_2| = \sqrt{1 - 0.25} = 0.866$

$A_2 = 0.866 e^{i\phi}$   
also works, for all  $\phi$ .

2. At some later time  $t$ ,  
what is the probability density at the center of the well?
- a. 0   b. 1   c. It depends on the time  $t$ .