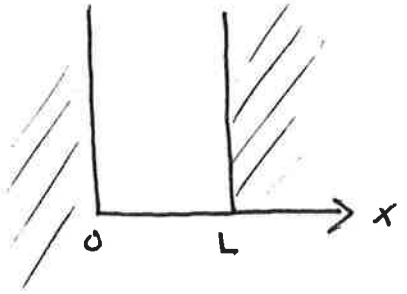
TL 6-10 (particle in ∞ square well)



Consider an interval $\Delta x = 0.002L$ (very narrow!). Compute probability of finding a particle in this interval at

($n=1$ for ground state)

a) $x = \frac{L}{2} \Rightarrow$ Since $\psi(x) = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right)$

and $P(x) = \frac{2}{L} \sin^2\left(\frac{n\pi x}{L}\right)$

so $P = P\left(\frac{L}{2}\right) \Delta x$

$= \frac{2}{L} \underbrace{\sin^2\left(\frac{\pi}{2}\right)}_{1} (0.002L)$

$= 0.004 = \boxed{0.4\%}$

b) $x = \frac{2L}{3} \Rightarrow P = \frac{2}{L} \underbrace{\sin^2\left(\frac{\pi}{L}\frac{2L}{3}\right)}_{3/4} (0.002L)$

$P = 0.003 = \boxed{0.3\%}$

c) $x = L \Rightarrow P = \frac{2}{L} \underbrace{\sin^2\left(\frac{\pi}{L}L\right)}_{0} (0.002L)$

$\boxed{P = 0}$