3) $E_n = \frac{\hbar^2 k_n^2}{2m}$ $k_n = \frac{n\pi}{L}$ $n = 1, 2, 3 \ldots$

$E_1 = \frac{\hbar^2}{2m}\left(\frac{\pi}{L}\right)^2$ $E_2 = \frac{\hbar^2}{2m}\left(\frac{2\pi}{L}\right)^2 = 4E_1$

$|\psi\rangle = \sqrt{P_1} e^{i\varphi_1} |1\rangle + \sqrt{P_2} e^{i\varphi_2} |2\rangle$

$|\psi, t\rangle = \underbrace{\sqrt{P_1} e^{i\varphi_1 - \frac{i}{\hbar}E_1 t}}_{a_1(t)} |1\rangle + \underbrace{\sqrt{P_2} e^{i\varphi_2 - \frac{i}{\hbar}E_2 t}}_{a_2(t)} |2\rangle$

$P_1(t) = |a_1(t)|^2 = P_1$ $P_2(t) = |a_2(t)|^2 = P_2$ indip. t