

$$a) \int_{-\infty}^{\infty} |\Psi(x, 0)|^2 dx = 1$$

$$|A|^2 \int_{-\infty}^{\infty} (3\psi_0(x) + 4\psi_1(x))^2 dx = 1$$

we know as
that $\int_{-\infty}^{\infty} |\psi_0(x)|^2 dx = 1$ and $\int_{-\infty}^{\infty} |\psi_1(x)|^2 dx = 1$

$$A^2 (3^2 + 4^2) = 1$$

$$A^2 = \frac{1}{25} \implies A = \frac{1}{5}$$

b) To construct $\Psi(x, t)$, just append factors $e^{-\frac{iE}{\hbar}t}$

$$\begin{aligned} \text{Thus } \Psi(x, t) &= \frac{1}{5} (3\psi_0(x) e^{-\frac{iE_0}{\hbar}t} + 4\psi_1(x) e^{-\frac{iE_1}{\hbar}t}) \\ &= \frac{1}{5} (3\psi_0 e^{-\frac{i\omega t}{2}} + 4\psi_1 e^{-i\frac{3}{2}\omega t}) \end{aligned}$$

$$|\Psi(x, t)|^2 =$$