

3. A system has two non-degenerate states $|1\rangle$ and $|2\rangle$ with energies E_1 and E_2 , respectively. At time $t = 0$ the system's state is $|\psi(0)\rangle = N(|1\rangle + |2\rangle)$, where N is a normalization constant. Write down the state of the system for times $t \geq 0$. Show that at time $\tau = \pi\hbar/(E_2 - E_1)$ the system's state is orthogonal to its state at $t = 0$.