Quiz 1

Let ρ_1 andρ_2 be density matrices in the same hilbert space. The Bures distance is defined as $D_B(\rho_1, \rho_2) = \sqrt{2(1 - Tr(\sqrt{\sqrt{\rho_1}\rho_2\sqrt{\rho_1}}))}\rho_1 = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}; \rho_2 = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix};$

Then D_B equals to

a, a^+ are creation ans annihilation operator respectively and $\hat{n} = a^+ a$ is the number operator. Then $[\hat{n}, [\hat{n}, [\hat{n}, a]]]$ is equal to

Let $\hat{n} = (n_1, n_2, n_3)$ and $\hat{m} = (m_1, m_2, m_3)$ be two unit vectors. $\bar{\sigma} = (\sigma_1, \sigma_2, \sigma_3)$ are the pauli matrices. The commutator $[\hat{n} \cdot \bar{\sigma}, \hat{m} \cdot \bar{\sigma}]$ equals to

GIven the Hamiltonian $\hat{H} = \hbar\omega\sigma_x$.

$|\Psi(t)\rangle$ is the solution of the Schrodinger equation $i\hbar\frac{d}{dt}|\Psi(t)\rangle = H|\Psi(t)\rangle$.

The transition probability $|\langle\Psi(t=0)|\Psi(t)\rangle|^2$ is given by