PHYS 481/690

Problem set # 1 *(due September 7)*
Each problem is 10 points.

Problems from Gerry& Knight: 2.5; 2.6; 2.7; 2.8; 3.5;

A1 Prove that coherent states are not orthogonal, *i.e.* that
$\langle\alpha|\beta\rangle = exp\{-\frac{1}{2}(|\alpha|^2 + |\beta|^2 - 2\alpha^*\beta)\}$.

A2 If the coherent state contains in an average one photon, what is the probability of measuring n photons?

A3 Compute the photon number fluctuations $\langle(\hat{a}^\dagger\hat{a})^2 - \langle\hat{a}^\dagger\hat{a}\rangle^2\rangle$ for a coherent state $|\alpha\rangle$.