

Homework 7

Let $|z\rangle$ be a coherent state:

$$a|z\rangle = z|z\rangle$$

and $H = \frac{1}{2}(aa^\dagger + a^\dagger a)$.

- ① Compute the spreads / standard deviations of

$$x = \frac{a + a^\dagger}{\sqrt{2}}, \quad p = \frac{a - a^\dagger}{\sqrt{2}i}$$

with respect to $|z\rangle$ ($\hbar \equiv 1$).

- ② Compute the time evolution of $|z\rangle$:

$$|z(t)\rangle = e^{-iHt} |z\rangle$$

- ③ The coherent state is said to be the "maximally classical state". Comment in terms of your results ① & ②.