

$$1. \ a = \sqrt{\frac{m\omega}{2\hbar}} \left[x + i \frac{p}{m\omega} \right]$$

$$2. \ [a, a^\dagger] = 1$$

$$3. \ a^\dagger |n\rangle = \sqrt{n+1} |n+1\rangle$$

$$4. \ a |n\rangle = \sqrt{n-1} |n-1\rangle$$

$$5. \ a^\dagger a |n\rangle = n |n\rangle$$