

$$\langle n | x | n' \rangle$$

$$|n\rangle \rightarrow f_n(x)$$

$$\langle n' | n \rangle \rightarrow \int_{-\infty}^{\infty} f_{n'}(x) f_n(x) dx$$

$$\hat{x} \cong \dots (\hat{a}_+ + \hat{a}_-)$$

$$\hat{p} \sim (\hat{a}_+ - \hat{a}_-)$$

$$\hat{a}_+ |n\rangle = \sqrt{n+1} |n+1\rangle$$

$$\hat{a}_- |n\rangle = \sqrt{n} |n-1\rangle$$

$$\langle n | \hat{x} | n' \rangle \rightarrow \dots |n'+1\rangle + \dots |n'-1\rangle$$

$$\delta_{n, n'+1}$$

$$\delta_{n, n'-1}$$

$$\Psi(x, t) = \sum_n c_n \psi_n(x) e^{-i \frac{E_n}{\hbar} t}$$

$$\langle x \rangle = \langle \Psi(x, t) | x | \Psi(x, t) \rangle$$

$$\delta_{n, n'+1} \rightarrow \hbar \omega$$