

1.11 Let Q be the operator of an observable and let $|\psi\rangle$ be the state of our system.

- a. What are the physical interpretations of $\langle\psi|Q|\psi\rangle$ and $|\langle q_n|\psi\rangle|^2$, where $|q_n\rangle$ is the n^{th} eigenket of the observable Q and q_n is the corresponding eigenvalue?
- b. What is the operator $\sum_n |q_n\rangle\langle q_n|$, where the sum is over all eigenkets of Q ? What is the operator $\sum_n q_n |q_n\rangle\langle q_n|$?
- c. If $u_n(x)$ is the wavefunction of the state $|q_n\rangle$, write down an integral that evaluates to $\langle q_n|\psi\rangle$.