5-2. If we transform only in the time and not the spatial variables, defining

$$k(x_b, E_b, x_a, E_a) = \int\int \exp\left(\frac{iE_b t_b}{\hbar}\right) K(x_b, t_b, x_a, t_a) \exp\left(-\frac{iE_a t_a}{\hbar}\right) dt_b\, dt_a \quad (5.20)$$

show that for a system with a time-independent hamiltonian H

$$k(x_b, E_b, x_a, E_a) = 2\pi\hbar^2 i\delta(E_b - E_a) \sum_n \frac{\phi_n(x_b)\phi_n^*(x_a)}{E_a - E_n + i\epsilon}$$

where E_n and $\phi_n(x)$ are the eigenvalues and eigenfunctions of H.