

From equation (6.1) we have

$$K_{U+V}(b, a) = \int_a^b \exp \left( \frac{i}{\hbar} \int_{t_a}^{t_b} \left( \frac{1}{2} m \dot{x}^2 - U - V \right) dt \right) \mathcal{D}x(t)$$

Consider equation (6.5).

$$K_0(b, a) = \int_a^b \exp \left( \frac{i}{\hbar} \int_{t_a}^{t_b} \frac{1}{2} m \dot{x}^2 dt \right) \mathcal{D}x(t) \quad (6.5)$$

By hypothesis the kernel for  $U$  is known hence

$$K_U(b, a) = \int_a^b \exp \left( \frac{i}{\hbar} \int_{t_a}^{t_b} \left( \frac{1}{2} m \dot{x}^2 - U \right) dt \right) \mathcal{D}x(t)$$

In the expansion of  $V$ , replace

$$\exp \left( \frac{i}{\hbar} \int_{t_a}^{t_b} \frac{1}{2} m \dot{x}^2 dt \right)$$

with

$$\exp \left( \frac{i}{\hbar} \int_{t_a}^{t_b} \left( \frac{1}{2} m \dot{x}^2 - U \right) dt \right)$$

This corresponds to replacing  $K_0$  with  $K_U$  in (6.4), etc.