

3-2. Given the free particle kernel

$$K_0(b, a) = \left(\frac{m}{2\pi i \hbar (t_b - t_a)} \right)^{1/2} \exp \left(\frac{im(x_b - x_a)^2}{2\hbar(t_b - t_a)} \right)$$

show that

$$\frac{\partial K_0}{\partial t_b} = -\frac{i}{\hbar} \left(-\frac{\hbar^2}{2m} \frac{\partial^2 K_0}{\partial x_b^2} \right)$$

See Eigenmath solution.