

Problem 8.8

Any complex function $\psi(x, t)$ which is square-integrable in x for each t can be written in Fourier form as

$$\psi(x, t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} dk C(k, t) e^{ikx}.$$

Substitute this expression into the free particle Schrödinger equation and derive an ordinary differential equation for $C(k, t)$. Find the general solution of this equation and thus derive (15.10).