

Find the Fourier Transform of the delta function.

Solution

$$\tilde{\delta}_{x_0}(k) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-ikx} \delta(x - x_0) dx \quad (1)$$

$$= \frac{1}{\sqrt{2\pi}} e^{-ikx_0} \quad (2)$$