Example 3.8 (Sifting property example)**.** Evaluate the integral

$$\int_{-\infty}^{\infty} [\sin t]\delta(t-\pi/4)dt.$$

Solution. Using the sifting property of the unit impulse function, we have

$$\int_{-\infty}^{\infty} [\sin t]\delta(t-\pi/4)dt = \sin\left(\tfrac{\pi}{4}\right) \quad = \sin t \,\big|_{t=\pi/4}$$

$$= \tfrac{1}{\sqrt{2}}.$$

■

$$\int_{-\infty}^{\infty} x(t)\,\delta(t-t_0)\,dt = x(t_0)$$

in this example, $x(t) = \sin t$ and $t_0 = \frac{\pi}{4}$