Find the inverse Fourier transform of $(\pi/20)\delta_{\pi/4}(\omega)$.

In the tables we find $\delta_T(t) \xleftrightarrow{\mathcal{F}} (1/T)\delta_{1/T}(f)$. We can convert this to the ω form by making the change of variable $f \to \omega/2\pi$. Then

$$\delta_T(t) \xleftrightarrow{\mathcal{F}} (1/T)\delta_{1/T}(\omega/2\pi)$$

From the definition of the periodic impulse

$$\delta_T(t) \xleftrightarrow{\mathcal{F}} (1/T)\sum_{k=-\infty}^{\infty}\delta(\omega/2\pi - k/T)$$

$$\delta_T(t) \xleftrightarrow{\mathcal{F}} (1/T)\sum_{k=-\infty}^{\infty}\delta((1/2\pi)(\omega - 2\pi k/T))$$

From the scaling property of the impulse

$$\delta_T(t) \xleftrightarrow{\mathcal{F}} (2\pi/T)\sum_{k=-\infty}^{\infty}\delta(\omega - 2\pi k/T)$$

Then we can recognize the summation as a periodic impulse

$$\delta_T(t) \xleftrightarrow{\mathcal{F}} (2\pi/T)\delta_{2\pi/T}(\omega).$$

From $(\pi/20)\delta_{\pi/4}(\omega)$ we want the period to be $\pi/4$. A T value of 8 makes that happen.

$$\delta_8(t) \xleftrightarrow{\mathcal{F}} (2\pi/8)\delta_{2\pi/8}(\omega) = (\pi/4)\delta_{\pi/4}(\omega)$$

Then we divide both sides by 5.

$$(1/5)\delta_8(t) \xleftrightarrow{\mathcal{F}} (\pi/20)\delta_{\pi/4}(\omega)$$

Alternate Solution:

Derive a scaling property for periodic impulses.

$$\delta_T(at) = \sum_{k=-\infty}^{\infty}\delta(at - kT) = (1/|a|)\sum_{k=-\infty}^{\infty}\delta(t - kT/a) = (1/|a|)\delta_{T/a}(t).$$

Now, start with

$$\delta_1(t) \xleftrightarrow{\mathcal{F}} \delta_1(f)$$

Making the change of variable $f \to \omega / 2\pi$ and using the scaling property for the periodic impulse

$$\delta_1(t) \xleftrightarrow{\mathcal{F}} \delta_1(\omega / 2\pi) = 2\pi\delta_{2\pi}(\omega)$$

Now, realizing that we want to change the period from 2π to $\pi / 4$ make the change of variable $\omega \to 8\omega$ to compress the ω function. The corresponding effect in the time domain is to divide by 8 and make the change of variable $t \to t / 8$.

$$(1/8)\delta_1(t/8) \xleftrightarrow{\mathcal{F}} 2\pi\delta_{2\pi}(8\omega)$$

Now, use the periodic impulse scaling property again on both sides.

$$8 \times (1/8)\delta_8(t) \xleftrightarrow{\mathcal{F}} (1/8) \times 2\pi\delta_{2\pi/8}(\omega)$$

or

$$\delta_8(t) \xleftrightarrow{\mathcal{F}} (\pi / 4)\delta_{\pi/4}(\omega).$$

Then,dividing both sides by 5

$$(1/5)\delta_8(t) \xleftrightarrow{\mathcal{F}} (\pi / 20)\delta_{\pi/4}(\omega)$$