Minimal Fourier transform table

$f(t)$	$F(\omega)$	$f(t)$	$F(\omega)$
$\operatorname{rect}(t) = \begin{cases} 0, & \lvert t\rvert \geq 1/2 \\ 1, & \lvert t\rvert < 1/2 \end{cases}$ $= H(t+1/2) - H(t-1/2)$	$\operatorname{sinc}(\omega/2) = \dfrac{\sin(\omega/2)}{\omega/2}$	1	$2\pi\delta(\omega)$
$e^{-at}H(t)$	$\dfrac{1}{a+i\omega}$	e^{iat}	$2\pi\delta(\omega-a)$
e^{-at^2}	$\sqrt{\dfrac{\pi}{a}}e^{-\omega^2/(4a)}$	$x^n, n \in \mathbb{N}$	$2\pi i^n \delta^{(n)}(\omega)$, where (n) means derivative
$e^{-a\lvert t\rvert}, \ a \in \mathbb{R}, a > 0$	$\dfrac{2a}{a^2+\omega^2}$	$1/x$	$-i\pi\operatorname{sgn}(\omega)$, where sgn is the sign function

Properties

- Linearity: for all $\lambda, \mu \in \mathbb{C}$, if $F(\omega) = \mathcal{F}\{f(t)\}$ and $G(\omega) = \mathcal{F}\{g(t)\}$, then $\mathcal{F}\{\lambda f(t) + \mu g(t)\} = \lambda F(\omega) + \mu G(\omega)$.
- Conjugation: $\mathcal{F}\{\overline{f(t)}\} = \overline{F(-\omega)}$
- Scaling: $\mathcal{F}\{f(ct)\} = \dfrac{1}{\lvert c\rvert} F\left(\dfrac{\omega}{c}\right)$ for $c \in \mathbb{R}\backslash\{0\}$.
- Displacement in time: $\mathcal{F}\{f(t-a)\} = e^{-i\omega a}F(\omega)$
- Displacement in frequency: $\mathcal{F}\{e^{i\omega' t}f(t)\} = F(\omega - \omega')$ for $\omega' \in \mathbb{R}$
- Derivative with respect to time: $\mathcal{F}\{f'(t)\} = i\omega F(\omega)$
- Derivative with respect to frequency: $\mathcal{F}\{tf(t)\} = iF'(\omega)$
- Convolution theorem („Faltungsprodukt"): $(f * g)(t) = \displaystyle\int_{-\infty}^{\infty} f(t-\tau)g(\tau)d\tau$. The Fourier transform of a convolution is $\mathcal{F}\{f * g\} = F(\omega)G(\omega)$.
- Duality: if f is continuous in t, $\mathcal{F}\{F(t)\} = 2\pi f(-\omega)$.
- Symmetry: if the function f is even or odd, then F is also even or odd.
- Inversion: $\mathcal{F}\{f(-t)\} = F(-\omega)$
- Parseval's identity: $\displaystyle\int_{-\infty}^{\infty} \lvert F(\omega)\rvert^2 d\omega = \int_{-\infty}^{\infty} [f(t)]^2 dt.$
- General Parseval's relation: $\displaystyle\int_{-\infty}^{\infty} F(\omega)\overline{G(\omega)}d\omega = \int_{-\infty}^{\infty} f(t)\overline{g(t)}dt.$

Warning: please check that this is correct!