There are three odd Fourier transform pairs that need to be memorized.

- sine and odd double impulse
- sign and reciprocal
- derivative and diagonal
The sine is defined with a characteristic period, \( \sin(2\pi t/t^0) \), or characteristic frequency, \( \sin(2\pi f/f^0) \). Both extend from \(-\infty\) to \(+\infty\).

The odd double impulse, \( \delta\delta^-(t^0) \) or \( \delta\delta^-(f^0) \), is defined as follows:

\[
\delta\delta^-(f^0) = -\frac{1}{2} \delta(f^0) + \frac{1}{2} \delta(-f^0)
\]

The Fourier transform of a temporal sine is an odd double impulse in the frequency domain. Note that \( f^0 = 1/f^0 \).
The temporal sign function is defined as \( \text{sign}(t > 0) = +1 \), \( \text{sign}(t < 0) = -1 \), and \( \text{sign}(0) = 0 \). It extends from \(-\infty\) to \(+\infty\).

The reciprocal function is defined as \( 1/\pi f \). Note that there are no characteristic periods or frequencies.

The Fourier transform of a temporal sign is a reciprocal frequency multiplied by \(-i\).
Derivative and Diagonal

The temporal derivative is defined as $d/dt$. The frequency diagonal is defined simply as $2\pi f$. The diagonal extends from $-\infty$ to $+\infty$. The diagonal and derivative always appear with a second transform pair, e.g. $F(t)$ and $\Phi(f)$. Note that there are no characteristic times or frequencies with this transform pair.

The derivative, $dF(t)/dt$, has the Fourier transform $i 2\pi f \Phi(f)$.