1) $f(t) = \begin{cases} 0 & , \quad t < -b, \quad t > b \\ a & \quad -b \leq t < 0 \\ -a & \quad 0 \leq t < b \end{cases}$
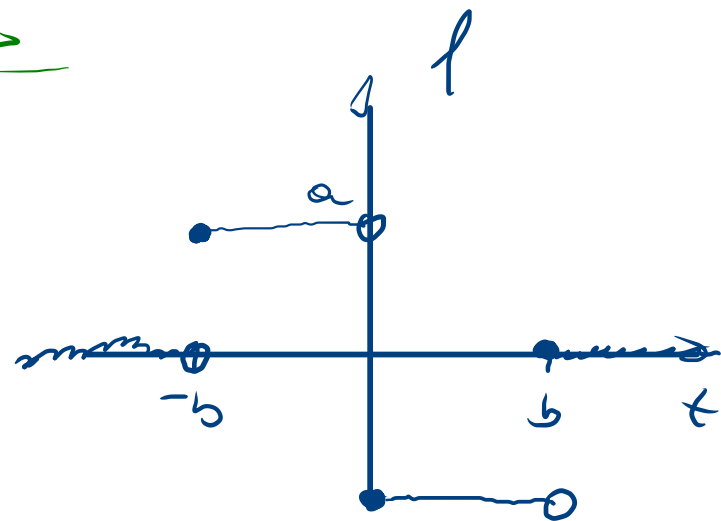
$$\hat{f} = \int_{-\infty}^{\infty} f(t) e^{-2\pi i \omega t} \, dt = \int_{-b}^{0} a e^{-2\pi i \omega t} \, dt - \int_{0}^{b} a e^{-2\pi i \omega t} \, dt$$

$$\mathcal{F} = -\frac{e}{2\pi i s}\, e^{-2\pi i s t}\Big|_{-b}^{0} + \frac{e}{2\pi i s}\, e^{-2\pi i s t}\Big|_{0}^{b}$$

$$= -\frac{e}{2\pi i s}\left(1 - e^{2\pi i s b}\right) + \frac{e}{2\pi i s}\left(e^{-2\pi i s b} - 1\right)$$

$$= -\frac{e}{\pi i s} + \frac{e}{2\pi i s}\left(e^{-2\pi i s b} + e^{2\pi i s b}\right)$$

$$= -\frac{e}{\pi i s} + \frac{e}{2\pi i s}\left(\cos 2\pi s b - i\sin 2\pi s b + \cos 2\pi s b + i\sin 2\pi s b\right)$$

$$= -\frac{e}{\pi i s} + \frac{e}{\pi i s}\cos 2\pi s b = \frac{e}{\pi i s}\left(\cos 2\pi s b - 1\right)$$