- Want the frequency shifted of a Fourier Transform

$$\tau_{\pm b}(\mathcal{F}f)(s) = \mathcal{F}f(s \mp b) = \int_{-\infty}^{\infty} f(t) \, e^{-2\pi i (s \mp b) t} \, dt$$

$$= \int_{-\infty}^{\infty} f(t) \, e^{-2\pi i s t} \, e^{\pm 2\pi i b t} \, dt$$

$$= \int_{-\infty}^{\infty} \left(f(t) e^{\pm 2\pi i b t} \right) e^{-2\pi i s t} \, dt$$

$$= \mathcal{F}\left(f \, e^{\pm 2\pi i b t} \right)$$