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$$\mathcal{F}(f(t)) = \int_{-\infty}^{\infty} f(t)\, e^{-j2\pi ft}\, dt = F(f)$$

$$f(t) = \int_{-\infty}^{\infty} F(f)\, e^{+j2\pi ft}\, df.$$

$$f(-t) = \int_{-\infty}^{\infty} F(f)\, e^{-j2\pi ft}\, df.$$

$$\mathcal{F}(-t) = \mathcal{F}(F(f)) = \mathcal{F}\mathcal{F}(f(t))$$

Similarly $\mathcal{F}\mathcal{F}(f(-t)) = f(t)$

$\therefore$ $\mathcal{F}\mathcal{F}(\mathcal{F}\mathcal{F}(f(t))) = \mathcal{F}\mathcal{F}(f(-t)) = f(t)$

Hence proved.