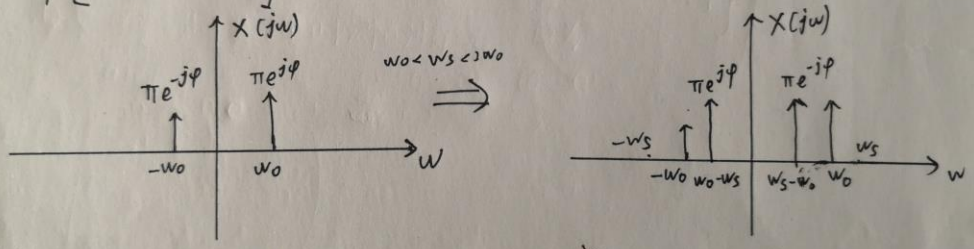
1. $\cos(\omega_0 t+\varphi) = \frac{1}{2}\left[e^{j(\omega_0 t+\varphi)} + e^{-j(\omega_0 t+\varphi)}\right]$

$= \frac{1}{2}\left[e^{j\varphi}\cdot e^{j\omega_0 t} + e^{-j\varphi}\cdot e^{-j\omega_0 t}\right]$.

$1 \Longleftrightarrow 2\pi\delta(\omega)$, $e^{j\omega_0 t} \Longleftrightarrow 2\pi\delta(\omega-\omega_0)$

$\therefore F[\cos(\omega_0 t+\varphi)] = \pi e^{j\varphi}\delta(\omega-\omega_0) + \pi e^{-j\varphi}\delta(\omega+\omega_0)$



此时 $F_2 = \pi e^{j\varphi}\delta(\omega+\omega_s-\omega_0) + \pi e^{-j\varphi}\delta(\omega-(\omega_s-\omega_0))$.

故 $f(t) = \cos\left[(\omega_s-\omega_0)t-\varphi\right]$.

显然相位相反且 $0<\omega_s-\omega_0<\omega_0$. 故命题成立.