hw5

t1. 解: $x(t) = \cos(w_0 t + \varphi)$, $x(t) \Leftrightarrow F(w)$

$$\therefore F(w) = \mathcal{F}\left[\frac{e^{j(w_0 t+\varphi)} + e^{-j(w_0 t+\varphi)}}{2}\right]$$

$$= \pi\left[e^{j\varphi}\delta(w-w_0) + e^{-j\varphi}\delta(w-w_0)\right]$$

$$F_s(w) = \frac{1}{T_s}\sum_{n=-\infty}^{+\infty} F(w - nw_s)$$

对于 $w_0 < w_c < 2w_0$, 取 w_s 之 $w_c < w_0$

则 $[-w_c, w_c]$ 内有2个峰

$$\therefore X_r(jw) = \pi\left[e^{j\varphi}\delta(w + w_s - w_0) + e^{-j\varphi}\delta(w - (w_s - w_0))\right]$$

$$\therefore x_r(t) = \frac{1}{2}\left[e^{j\varphi} e^{-(w_s-w_0)jt} + e^{-j\varphi} e^{(w_s-w_0)jt}\right]$$

$$= \cos((w_s - w_0)t - \varphi).$$