数字信号处理　第八周作业

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作业内容：4.2，4.3，4.4，4.5

Problem 4.2

此处 $\omega = 0.25\pi$ ，那么 $\Omega = \omega/T = 250\pi$ ；类似的 $\omega = 0.25\pi + 2\pi$ 时，$\Omega = 2250\pi$ 。

Problem 4.3

SubProblem a

$$\omega = \frac{\pi}{3} = 4000\pi\frac{1}{T}, T = 12000$$

SubProblem b

$$\omega = \frac{\pi}{3} + 2\pi = 4000\pi\frac{1}{T}, T = \frac{12000}{7}$$

Problem 4.4

SubProblem a

$$\begin{cases}\omega_1 = \dfrac{\pi}{5} = 20\pi/T \\ \omega_2 = \dfrac{2\pi}{5} = 40\pi/T\end{cases}, \therefore T = 100$$

SubProblem b

$$\begin{cases}\omega_1 = \dfrac{\pi}{5} + 2k_1\pi = 20\pi/T \\ \omega_2 = \dfrac{2\pi}{5} + 2k_2\pi = 40\pi/T\end{cases}$$

$$\therefore T = \frac{100}{10k_1 + 1} = \frac{100}{10k_2 + 2}$$

而 k_i 为整数，因此不存在其他解。

Problem 4.5

SubProblem a

$$\Omega_S = 2\pi/T = 2.5k \cdot 2\pi, T = 10^{-5}s$$

SubProblem b

$$\omega = \Omega T,\ \Omega_S = \frac{\omega}{T},\ f_s = \Omega_S/2\pi = 625Hz$$

SubProblem c

同上，

$$f_S = 2f_{S,(b)} = 1250Hz$$