数字作业纸

1. 解: $f_s = 10^4 Hz$ $\Delta f \leq 10Hz$ 且 $L \geq f_s / \Delta f$

$$t = \frac{L}{f_s} \geq \frac{1}{\Delta f} = 0.1s$$

由 Nyquist 采样定理:

$$f_{max} \leq \frac{1}{2} f_s = 5kHz$$

2. 解: (a) $t = \frac{128}{40kHz} = 3.2\ ms$

(b) $f = 5kHz$ $f_s = 40kHz$

$$\omega_0 = \frac{2\pi f}{f_s} = \frac{\pi}{4}$$

在 ω_0, $2\pi - \omega_0$ 处有冲激信号

$n_1 = \frac{\pi}{4} / 2\pi \times 128 = 16$

$n_2 = 128 - 16 = 112$

在 $k = 16, 112$ 时有峰值出现

3. 解:

$$\Delta f \geq \frac{f_s}{L} = \frac{1}{T} = 100Hz = 0.1kHz$$

因为 $f_1 < f_2 < f_3 = 2kHz$

$1kHz$

故 $f_1 + \Delta f \leq f_2 \leq f_3 - \Delta f$

即 $1.1kHz \leq f_2 \leq 1.9kHz$