

P373.78

抄成1

$$x_1(n) = \{1, 2, 3, 1\}, \quad x_2(n) = \{4, 3, 2, 2\} \text{ 题目抄错了.}$$

$$y(n) = x_1(n) \circledast x_2(n) = \sum_{k=0}^3 x_1(k) x_2[n-(n-k)]$$

$$y(0) = \sum_{k=0}^3 x_1(k) x_2[0-k] = 4 + 4 + 6 + 3 = 17$$

$$y(1) = \sum_{k=0}^3 x_1(k) x_2[1-k] = 3 + 8 + 8 + 2 = 19$$

$$y(2) = \sum_{k=0}^3 x_1(k) x_2[2-k] = 2 + 6 + 12 + 2 = 22$$

$$y(3) = \sum_{k=0}^3 x_1(k) x_2[3-k] = 4 + 9 + 4 = 17$$

$$\therefore \{17, 19, 22, 17\}$$

P373.79

$$x_1(n) \otimes x_2(n) \leftrightarrow \bar{X}_1(k) \cdot \bar{X}_2(k) \cdot W_N^k = e^{-j\frac{2\pi}{4} \cdot k}$$

$$\bar{X}_1(0) = x_1(0) + x_1(1)W_N^1 + x_1(2)W_N^2 + x_1(3)W_N^3 = -2 - j$$

$$\bar{X}_1(1) = x_1(0) + x_1(1)W_N^2 + x_1(2)W_N^4 + x_1(3)W_N^6 = 7$$

$$\bar{X}_1(2) = x_1(0) + x_1(1)W_N^3 + x_1(2)W_N^6 + x_1(3)W_N^9 = 1$$

$$\bar{X}_1(3) = x_1(0) + x_1(1)W_N^4 + x_1(2)W_N^8 + x_1(3)W_N^{12} = -2 + j$$

$$\bar{X}_2(0) = \sum_{i=0}^3 x_2(i) = 11, \quad \bar{X}_2(1) = 2 - j, \quad \bar{X}_2(2) = 0, \quad \bar{X}_2(3) = 2 + j$$

$$\therefore Y(0) = 7, \quad Y(1) = -5, \quad Y(2) = 0, \quad Y(3) = -5$$

$$y(n) = \frac{1}{4} \sum_{k=0}^{N-1} Y(k) W_N^{-nk}, \quad y(0) = 17, \quad y(1) = 19, \quad y(2) = 22, \quad y(3) = 17$$

$$\therefore y(n) = \{17, 19, 22, 17\}$$



P373. 7.11

$$x(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$$

$$(a) \quad x_1(n) = \{1, 0, 0, 0, 0, 1, 1, 1\} = x[(n-5)/8]$$

$$\therefore \bar{x}_1(k) = \bar{x}(k) e^{-j\frac{2\pi}{8}k \cdot 5} = \bar{x}(k) e^{-j\frac{5\pi}{4}k}$$

$$(b) \quad x_2(n) = \{0, 0, 1, 1, 1, 1, 0, 0\} = x[(n-2)/8]$$

$$\therefore \bar{x}_2(k) = \bar{x}(k) e^{-j\frac{2\pi}{8}k \cdot 2} = \bar{x}(k) e^{-j\frac{\pi}{2}k}$$

$$\bar{x}(k) = \text{不计算} \{ \text{不计算} \}$$

P374. 7.14(a).

$$Y(k) = \bar{x}_1(k) \cdot \bar{x}_2(k), \quad y(n) = x_1(n) \otimes x_2(n).$$

$$y(0) = \sum_{k=0}^4 x_1(k) x_2[0-k] = 4, \quad y(1) = 0, \quad y(2) = 1, \quad y(3) = 2.$$

$$\therefore y(n) = \{4, 0, 1, 2, 3\} \quad y(4) = 3.$$

P375. 7.23

$$(b) \quad x(n) = \delta(n-n_0), \quad \bar{x}(k) = \sum_{n=0}^{N-1} \delta(n-n_0) W_N^{kn}, \quad W_N^k = e^{-j\frac{2\pi}{N}k}$$

$$\therefore \bar{x}(k) = W_N^{kn_0} = e^{-j\frac{2\pi}{N}kn_0} \quad (k \in [0, N-1], k \in \mathbb{Z})$$

$$(c) \quad x(n) = a^n, \quad \bar{x}(k) = \sum_{n=0}^{N-1} x(n) e^{-j\frac{2\pi}{N}kn} = \sum_{n=0}^{N-1} a^n e^{-j\frac{2\pi}{N}kn}$$

$$= (1-a^N) / (1-a e^{-j\frac{2\pi}{N}k}), \quad k=0, 1, \dots, N-1.$$

$$(d) \quad x(n) = \begin{cases} 1 & 0 \leq n \leq \frac{N}{2}-1 \\ 0 & \text{o.w.} \end{cases}, \quad \bar{x}(k) = \sum_{n=0}^{\frac{N}{2}-1} x(n) e^{-j\frac{2\pi}{N}kn} = \sum_{n=0}^{\frac{N}{2}-1} e^{-j\frac{2\pi}{N}kn}$$

$$= [1 - e^{-j\frac{2\pi}{N}k \cdot \frac{N}{2}}] / (1 - e^{-j\frac{2\pi}{N}k}).$$

$$(e) \quad x(n) = e^{j\frac{2\pi}{N}k_0 n}, \quad \bar{x}(k) = \sum_{n=0}^{N-1} e^{j\frac{2\pi}{N}k_0 n} e^{-j\frac{2\pi}{N}kn} = N \delta(k-k_0).$$

$$1 \leftrightarrow N \delta(k).$$



1' 413, 8.8

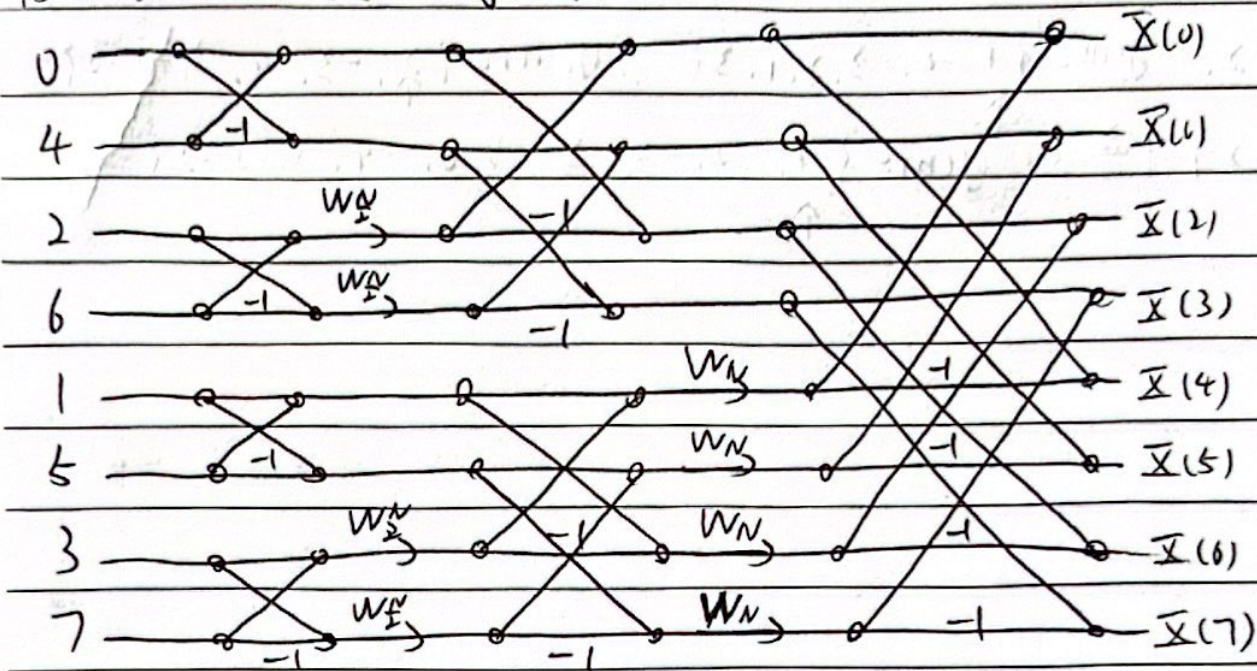
$x(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$ $N=8=2^3$ 分三级.

0 2 4 6 1 3 5 7

04 26 15 37 逆序时间

04 26 15 37 X.

~~按顺序~~ 按时间抽取的图:



附1.

$X(k)$ 与 $x(n)$ 有同样的点数. 那么 $g(n) = \begin{cases} h(n) & 0 \leq n \leq N-1 \\ 0 & N \leq n \leq 3N-1 \end{cases}$

附3. 240

256, ~~256~~, 32, 64.



附2: $y_1(n) = \{1, -2, -3, 2, 1, 3\}$, $y_2(n) = \{2, -3, -4, 3, -2, -2\}$.

有2个重叠: $y(n) = \{1, -2, -3, 2, 3, 0, -4, 3, -2, -2\}$

