[IT CookBook] 기초 신호 및 시스템
: 개념과 원리가 한눈에 보이는 200여 개의 풍부한 예제

[연습문제 답안 이용 안내]

Chapter 08 기본적인 이산 신호와 연산

[Quick Review]

[1] *Ans)* 이산

[2] *Ans)* ×

[3] *Ans)* 있다

[4] *Ans)* $u[n]-u[n-4]$

[5] *Ans)* ×

[6] *Ans)* ○

[7] *Ans)* 2π

[8] *Ans)* 누적 합

[9] *Ans)* ×

[10] *Ans)* 솎음

[11] *Ans)* ×

[12] *Ans)* ○

[13] *Ans)* 복호화

[14] *Ans)* ×

[15] *Ans)* ○

[16] *Ans)* 샘플링

[17] *Ans)* 저역

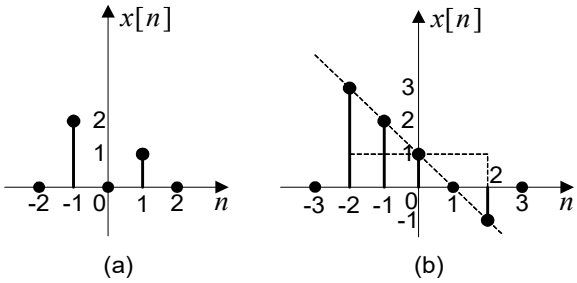
[18] *Ans)* ○

[19] *Ans)* ×

[20] *Ans)* 나이퀴스트

[기초 문제]

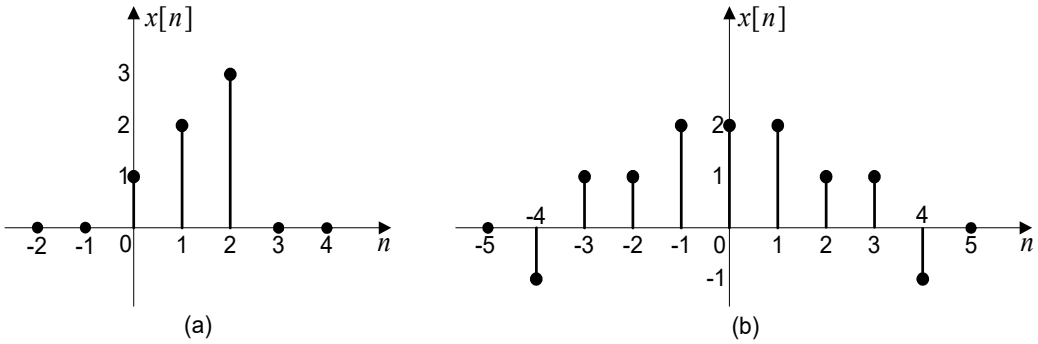
8.1 *Ans)*



8.2 *Ans)*

(a) $x[n] = \delta[n] + 2\delta[n-1] + 3\delta[n-2]$

(b) $x[n] = -\delta[n+4] + \delta[n+3] + \delta[n+2] + 2\delta[n+1]$
$+ 2\delta[n] + 2\delta[n-1] + \delta[n-2] + \delta[n-3] - \delta[n-4]$



8.3 *Ans)*

(a) $x[n] = u[n] + u[n-1] + u[n-2] - 3u[n-3]$

또는 $x[n] = n\,u[n] - (n-3)u[n-3] + u[n] - 4u[n-3]$

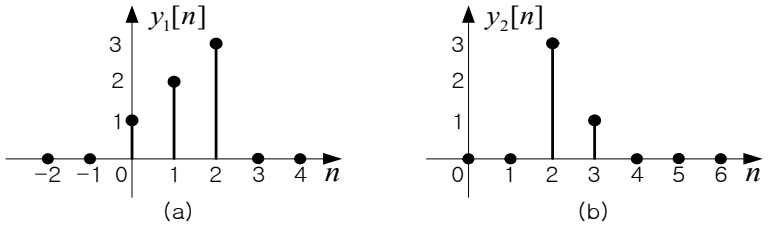
(b) $x[n] = -u[n+4] + 2u[n+3] + u[n+1] - u[n-2] - 2u[n-4] + u[n-5]$

8.4 *Ans)*

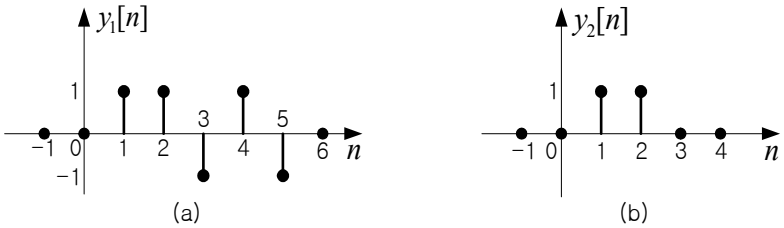
(a) $x[n] = -(n+5)u[n+5] + (n+7)u[n+2] - (n-3)u[n-3] + (n-5)u[n-5]$

(b) $x[n] = -(n+2)u[n+4] + (2n+3)u[n] + (n-6)u[n-2] - (2n-5)u[n-4]$

8.5 *Ans)*



(a)



(b)

8.6 *Ans)*

(a) $x[n]=\begin{cases}8, & n=3\\ 0, & \text{그 외}\end{cases}$

(b) $x[n]=1, \quad n=0,\ 10,\ 20,\ 30,\ 40,\ \cdots$

8.7 *Ans)*

(a) $T_s=0.01$

(b) $T_s'=T_s+0.1k=0.01+0.1k, \quad k=1,\ 2,\ 3,\ \cdots$

8.8 *Ans)*

(a) $x_0(t)=\cos(10\pi t)$

$x_1(t)=\cos(10\pi t+20\pi t)=\cos(30\pi t)$

(b) $x_0(t)=\cos(\frac{5\pi}{4}t)$

$x_1(t)=\cos(\frac{5\pi}{4}t+20\pi t)=\cos(\frac{85\pi}{4}t)$

8.9 *Ans)*

$$\begin{cases}x_1(t)=2\cos(2\pi f_{01}t-\pi/4)=2\cos(20\pi t-\pi/4)\\ x_2(t)=2\cos(2\pi(f_{01}+f_s)t-\pi/4)=2\cos(220\pi t-\pi/4)\\ x_3(t)=2\cos(2\pi(f_{01}-f_s)t-\pi/4)=2\cos(-180\pi t-\pi/4)=2\cos(180\pi t+\pi/4)\\ x_4(t)=2\cos(2\pi(f_{01}-2f_s)t-\pi/4)=2\cos(-380\pi t-\pi/4)=2\cos(380\pi t+\pi/4)\end{cases}$$

8.10 *Ans)*

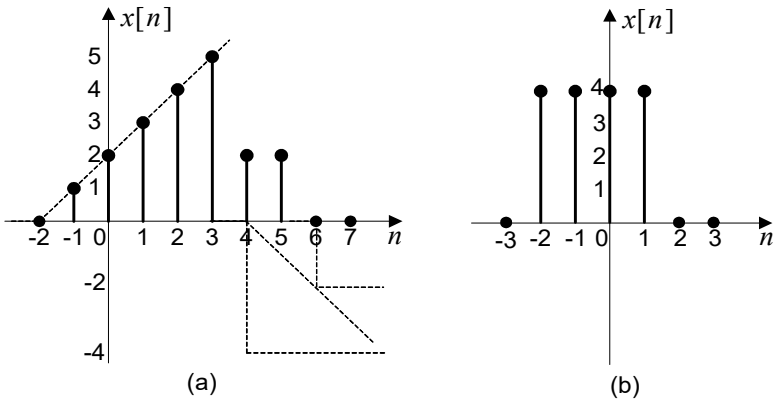
(a) $f_s=2f_0=2\times 200=400\,[\text{Hz}]$ 또는 $\omega_s=2\pi f_s=800\pi$

(b) $f_s=2f_1=160\,[\text{Hz}]$ 또는 $\omega_s=2\pi f_s=320\pi$

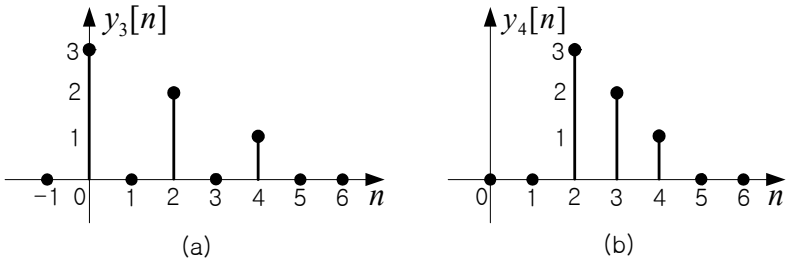
(c) $f_s=2f_3=200\,[\text{Hz}]$ 또는 $\omega_s=2\pi f_s=400\pi$

[응용 문제]

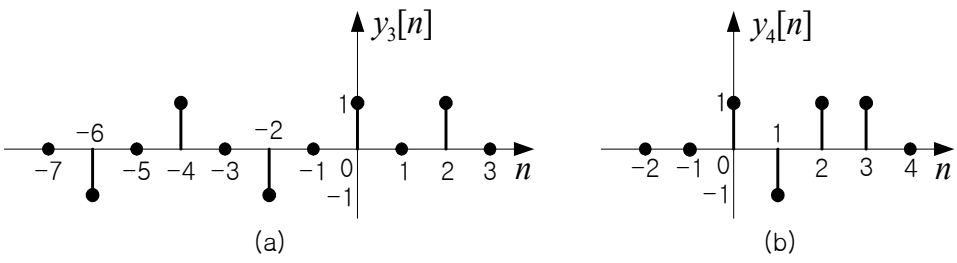
8.11 *Ans)*



8.12 *Ans)*



(a)



(b)

8.13 *Ans)*

(a) $N = 10$

(b) $\omega_0 = 220\pi,\ 420\pi,\ 620\pi,\ \cdots$

(c) $N = 10$

8.14 *Ans)*

(a) $F_0 = 0.5, \quad \phi = -\frac{\pi}{2}$

(b) $F_0 = 0.5, \quad \phi = -\frac{\pi}{2}$

(c) $F_0 = \frac{3}{8} = 0.375, \quad \phi = -\frac{\pi}{2}$

8.15 *Ans)*

(a) $f_s' = 2f_s$

(b) $f_s' = 2f_s$

(c) $f_s' = f_s + 2f_c$