

[IT CookBook] 기초 신호 및 시스템

: 개념과 원리가 한눈에 보이는 200여 개의 풍부한 예제

[연습문제 답안 이용 안내]

- 본 연습문제 답안의 저작권은 한빛아카데미(주)에 있습니다.
- 이 자료를 무단으로 전제하거나 배포할 경우 저작권법 136조에 의거하여 최고 5년 이하의 징역 또는 5천만원 이하의 벌금에 처할 수 있고 이를 병과(併科)할 수도 있습니다.

Chapter 03 기본적인 신호와 연산

[Quick Review]

- [1] Ans) \times
- [2] Ans) 사각 펄스
- [3] Ans) 계단 함수
- [4] Ans) \times
- [5] Ans) 체 거르기
- [6] Ans) 연속
- [7] Ans) \times
- [8] Ans) \times
- [9] Ans) 같은
- [10] Ans) 시간축
- [11] Ans) 진폭 반전
- [12] Ans) $-\infty < t < \infty$
- [13] Ans) 크기축
- [14] Ans) 앞섬
- [15] Ans) \times
- [16] Ans) 척도 조절, 이동
- [17] Ans) 3, 지연

[18] Ans) ×

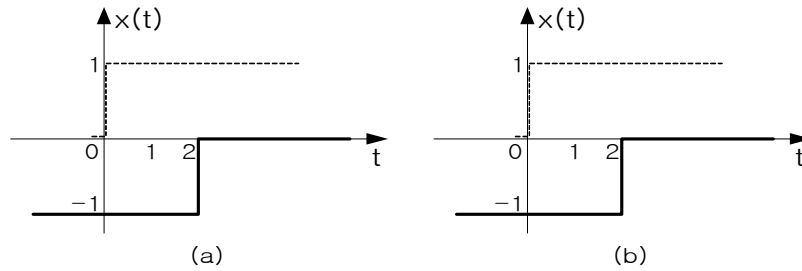
[19] Ans) ○

[20] Ans) ×

[기초 문제]

3.1

Ans)

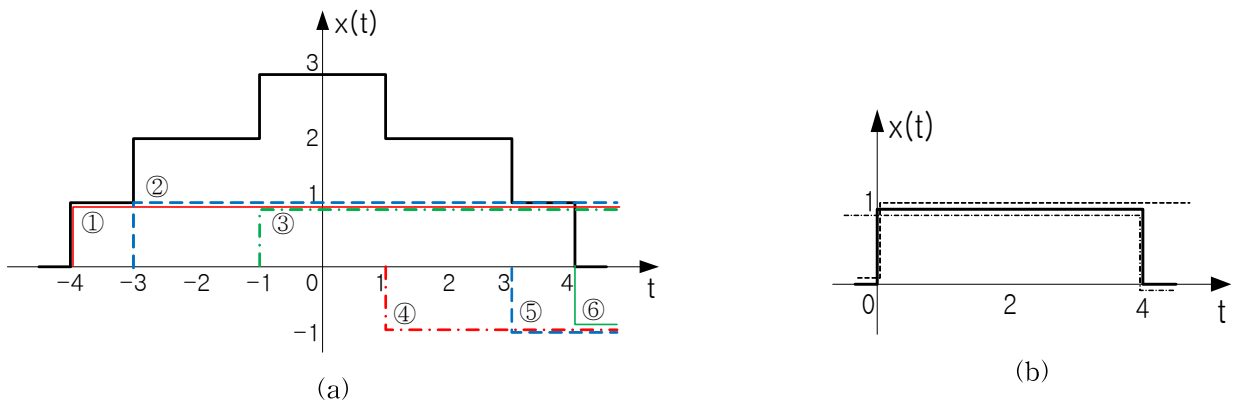


3.2

Ans)

(a) $x(t) = u(t+4) + u(t+3) + u(t+1) - u(t-1) - u(t-3) - u(t-4)$

(b) $x(t) = u(t) - u(t-4)$



3.3

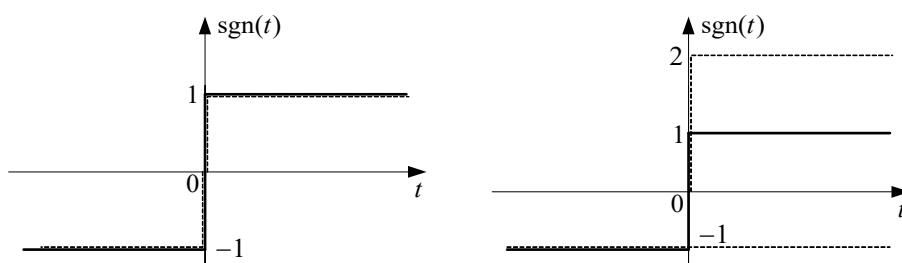
Ans)

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

(b) $x(t) = (t+1)u(t+1) - tu(t) - (t-1)u(t-1) + 2(t-3)u(t-3) - (t-4)u(t-4)$

3.4

Ans) $\text{sgn}(t) = u(t) - u(-t) = 2u(t) - 1$



3.5

Ans)

$$(a) \int_{-\infty}^{\infty} (t^2 - 3t + 2)\delta(t - 2)dt = 0$$

$$(b) \int_{-\infty}^{\infty} \cos(3(t + 2))\delta(2t + 4)dt = 1$$

3.6

Ans)

$$(a) x(t) = 4\cos(\pi t - \frac{\pi}{3})$$

$$(b) x(t) = 2\sqrt{2}\cos(\pi t - \frac{\pi}{4})$$

3.7

Ans)

$$(a) x(t) = 2e^{-2t}\cos(2t)$$

$$(b) x(t) = 2\sqrt{2}e^{-3t}(\cos(2t + \frac{\pi}{4}) + j\sin(2t + \frac{\pi}{4}))$$

$$(c) x(t) = e^{-t}(\cos(t) - j\sin(t))$$

3.8

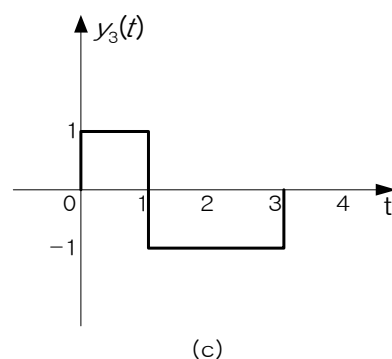
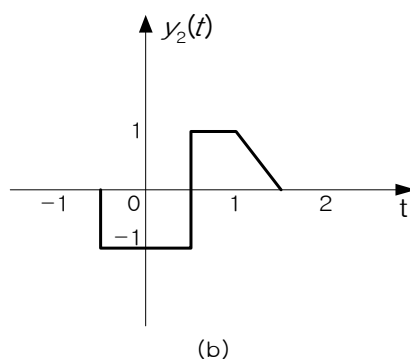
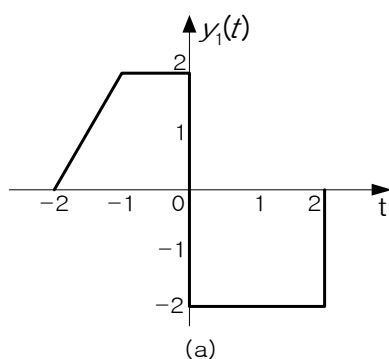
Ans)

$$(a) x(t) = e^{j(\pi t + \frac{\pi}{4})}$$

$$(b) x(t) = e^{-(2 + j\pi)t}$$

3.9

Ans)



3.10

Ans)

$$(a) x(t) = u(t) - u(t - 1) + u(t - 2)$$

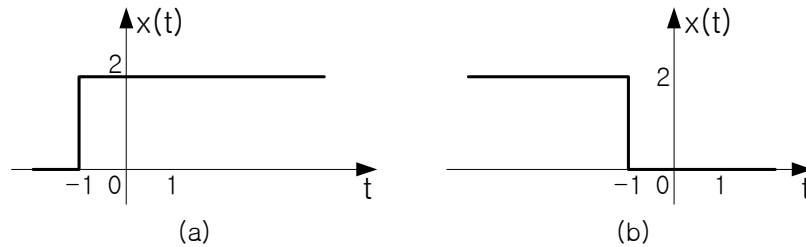
(b) $y(t) = u(-t) - u(t) + 2u(t-2) - 2u(t-4)$

(c) $y(t) = 2x(-(t-4)/2) - 1$

[응용 문제]

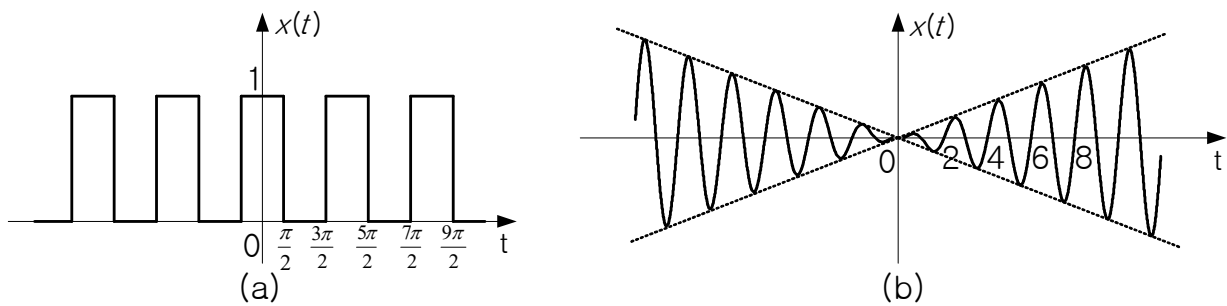
3.11

Ans)



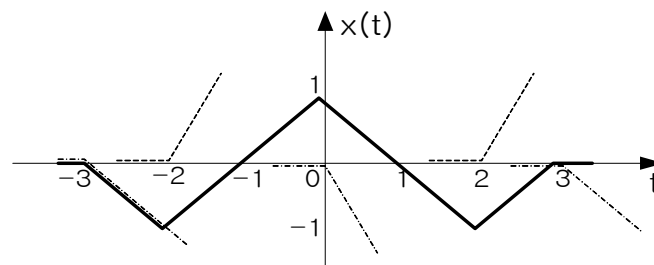
3.12

Ans)



3.13

$$\begin{aligned} \text{Ans) } x(t) &= -(t+3)(u(t+3) - u(t+2)) + (t+1)(u(t+2) - u(t)) \\ &\quad - (t-1)(u(t) - u(t-2)) + (t-3)(u(t-2) - u(t-3)) \\ &= -r(t+3) + 2r(t+2) - 2r(t) + 2r(t-2) - r(t-3) \end{aligned}$$



3.14

Ans)

$$(a) \int_{-\infty}^{\infty} \left(\delta(t) \cos(t) + \delta\left(t - \frac{\pi}{2}\right) \sin(t) \right) dt = 2$$

$$(b) \int_{-\infty}^{\infty} (\cos(t)) u\left(t - \frac{\pi}{4}\right) \delta(t) dt = 0$$

3.15

Ans)

