

# 信号与系统 B · 作业答案

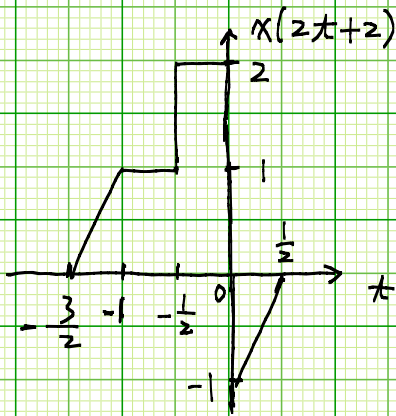
2013

便笺标题

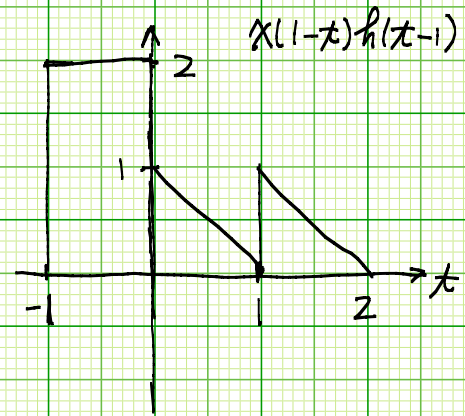
2013-12-11

第二章

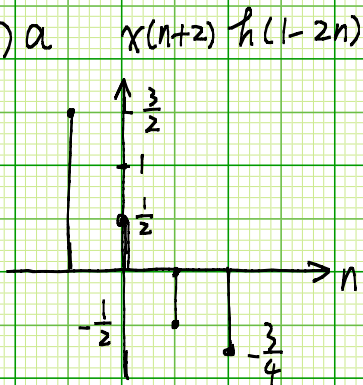
2.1 (1) c



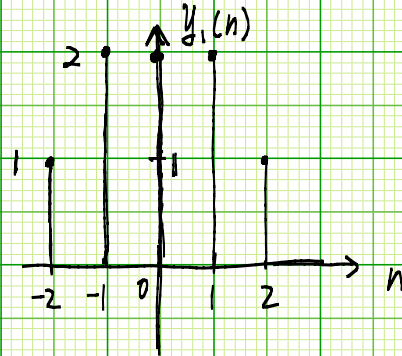
(3) b



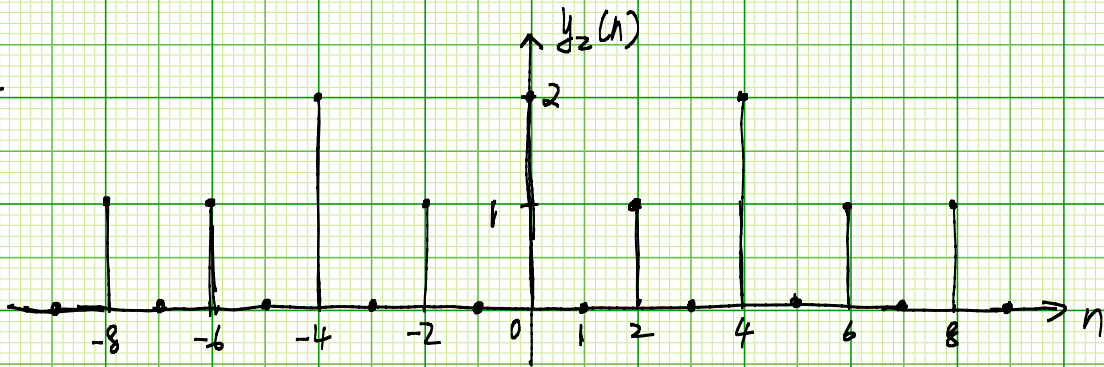
2.3 (3) a



(3) c



(3) c



2.6 (1) (a) V (b) V (c) V (d) V

(2) (a) V (b) X (c) V (d) V

2.7 (b) 周期  $N=7$  (f) 非周期

(g) 非周期 (j) 周期  $N=16$

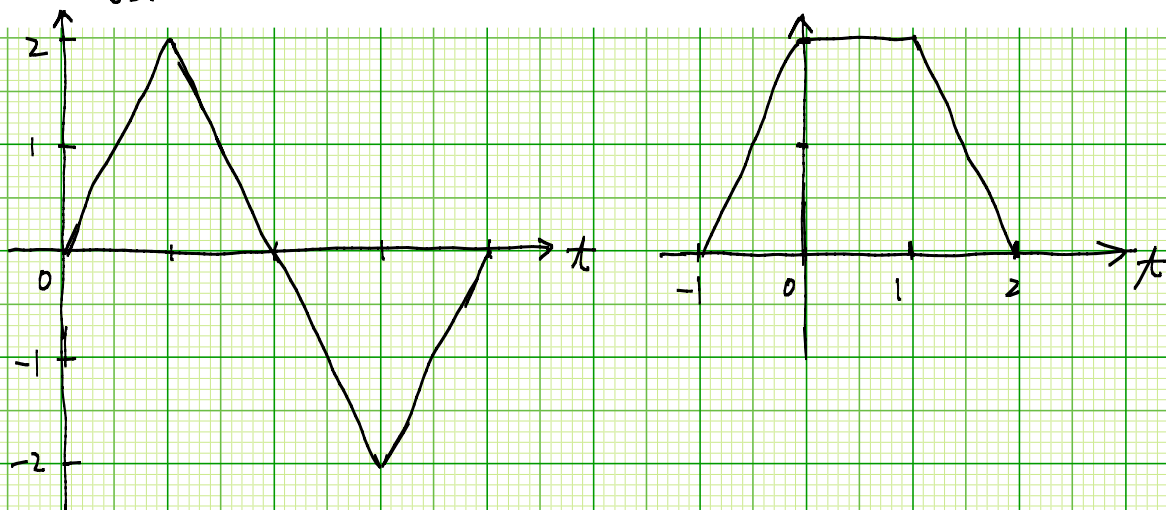
2.12. (a) 瞬时 时不变 非线性 因果 稳定

(c) 动态 时变 线性 非因果 稳定  
(非瞬时)

2.17

$$y_2(t) = y_1(t) - y_1(t-2)$$

$$y_3(t) = y_1(t+1) + y_1(t)$$



2.18 (a)  $y(n) = 3y_1(n) - 2y_2(n) + 2y_3(n)$

(b)  $y_2(n) = y_1(n) + y_1(n-1)$

$y_3(n) = y_1(n+1)$

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### 第三章

3.1 (a)  $\alpha = \beta$  时  $x(t) * h(t) = t e^{\alpha t} u(t)$   
 $\alpha \neq \beta$  时  $= \frac{e^{\alpha t} - e^{\beta t}}{\alpha - \beta} u(t)$

(c)  $\frac{1}{3} [1 - e^{-3(t-1)}] u(t-1)$

(e)  $\frac{\cos \pi t - 1}{\pi} [u(t+2) - u(t)]$

3.2 (b)  $y(n) = 2^{n+1} u(-n) + 2u(n-1)$

(c)  $y(n) = \frac{(-1)^n - 1}{2} [u(n+7) - u(n-1)] + \frac{1 - (-1)^n}{2} [u(n-1) - u(n-8)]$

或  $= \frac{(-1)^n - 1}{2} [u(n+7) - u(n)] + \frac{1 - (-1)^n}{2} [u(n) - u(n-8)]$

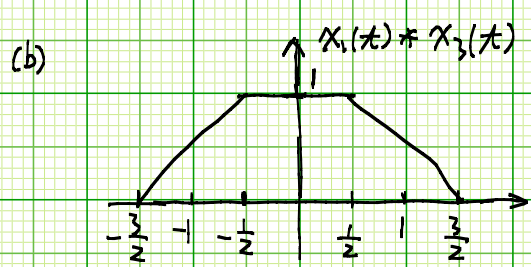
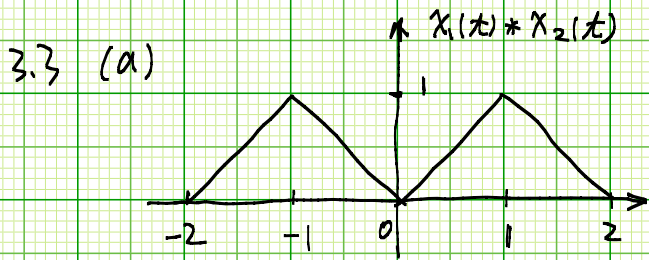
$$[-1 \ 0 \ -1 \ 0 \ -1 \ 0 \ -1 \ \boxed{0} \ | \ 0 \ | \ 0 \ | \ 0 \ | \ 0 \ | \ 1]$$

$$\uparrow$$

$$n=0$$

$$(f) \quad y(n) = [1 \quad 3 \quad 5 \quad \boxed{6} \quad 6 \quad 6 \quad 5 \quad 3 \quad 1]$$

$\uparrow$   
 $n=0$



3.4 (a)  $y(t) = 2y_0(t)$

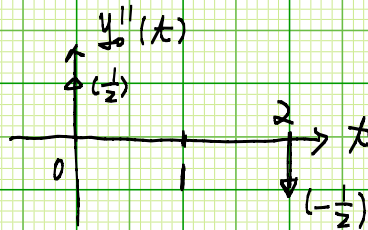
(b)  $y(t) = y_0(t) - y_0(t-2)$

(c)  $y(t) = y_0(t-1)$

(d)  $y(t) = y_0(-t)$

以上 (c) 和 (d)

(e)  $y(t) = y_0''(t)$



3.5  $\sin 8n$

3.7 (a)  $h(t) = e^{-(t-2)} u(t-2)$

(b) 
$$y(t) = [1 - e^{-(t-1)}] [u(t-1) - u(t-4)] + [e^{-(t-4)} - e^{-(t-1)}] u(t-4)$$

或 
$$y(t) = \begin{cases} 0 & t \leq 1 \\ 1 - e^{-(t-1)} & 1 < t \leq 4 \\ e^{-(t-4)} - e^{-(t-1)} & t > 4 \end{cases}$$

3.8 (a)  $h(t) = e^{-(t-2)} u(t-2) - e^{-(t-3)} u(t-3)$

(b) 
$$y(t) = \begin{cases} 0 & t < 1 \\ 1 - e^{-(t-1)} & 1 \leq t < 2 \\ e^{-(t-2)} - e^{-(t-1)} & 2 \leq t < 4 \\ e^{-(t-4)} - e^{-(t-1)} + e^{-(t-2)} - 1 & 4 \leq t < 5 \\ e^{-(t-4)} + e^{-(t-2)} - e^{-(t-1)} - e^{-(t-5)} & t \geq 5 \end{cases}$$

3.10 (a) V (b) X (c) X (d) V

(e) X (f) X (g) X (h) V

3.14  $y_2(x) = \frac{1 - \cos \pi x}{\pi} [u(x) - u(x-2)]$

3.15  $y(-2) = 1 \quad y(-1) = 0 \quad y(0) = 5 \quad y(1) = -4 \quad y(2) = 16$

$y(3) = -27 \quad y(4) = 58 \quad y(5) = -114 \quad \Rightarrow 5 \text{ 时 } y(n) = -114(-2)^{n-5}$

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第 4 章

4.2. (a)  $a_2 = a_{-2} = \frac{1}{2} \quad a_3 = \frac{1}{2j} \quad a_{-3} = \frac{-1}{2j} \quad a_k = 0 \quad k \neq \pm 2, \pm 3$

(c)  $a_0 = 0 \quad k \neq 0 \text{ 时 } a_k = \frac{j(-1)^k}{k\pi}$

(e)  $a_0 = \frac{1}{2} \quad k \neq 0 \text{ 时 } a_k = \frac{1 - (-1)^k}{k^2 \pi^2}$

4.6 (a)  $\dot{A}_k e^{-jk\Omega_0 t} \quad (c) \quad \dot{A}_{-k}^*$

(e)  $j k \Omega_0 \dot{A}_k$

4.8 (a)  $\frac{1}{3 + j\Omega} [e^6 e^{j2\Omega} - e^{-9} e^{-j3\Omega}]$

(c)  $\frac{2 - 2 \cos 2\Omega}{\Omega^2} = \frac{4 \sin^2 \Omega}{\Omega^2}$

(e)  $\left[ \frac{2}{\Omega} - \frac{1}{\Omega - \pi} - \frac{1}{\Omega + \pi} \right] \sin \Omega$

4.10  $X(j\Omega) = \frac{1}{j\Omega} + \frac{1 - e^{-j\Omega}}{\Omega^2}$

$X_1(j\Omega) = e^{-j\Omega} X(j\Omega) \quad X_2(j\Omega) = e^{j\Omega} X(-j\Omega)$

$X_3(j\Omega) = 4 e^{-j2\Omega} X(-j2\Omega) \quad X_4(j\Omega) = X(j\Omega) + X(-j\Omega)$

$X_5(j\Omega) = X(j\Omega) + e^{-j\Omega} X(-j\Omega) \quad \text{或} \quad 1 - j\Omega X(j\Omega)$

$$X_6(j\Omega) = \frac{1}{2} \left\{ X[j(\Omega + \Omega_0)] + X[-j(\Omega + \Omega_0)] + X[j(\Omega - \Omega_0)] + X[-j(\Omega - \Omega_0)] \right\}$$

4.11 (a) 7 (b)  $4\pi$  (d)  $\frac{76}{3}\pi$

4.3 (a)  $y(x) = \frac{1}{2} \frac{1}{4 + j2\pi} e^{j2\pi x} + \frac{1}{2} \frac{1}{4 - j2\pi} e^{-j2\pi x}$

(b)  $y(x) = \sum_{k=-\infty}^{\infty} \frac{1}{4 + j2k\pi} e^{j2k\pi x}$

4.14  $A_0 = \frac{1}{2T}$   $k \neq 0$  时  $A_k = \frac{j e^{-jk\Omega_0}}{2k\pi} + \frac{T}{4k^2\pi^2} [e^{-jk\Omega_0} - 1]$

$$X(j\Omega) = 2\pi \sum_{k=-\infty}^{\infty} A_k \delta(\Omega - k\Omega_0)$$

4.16 (a)  $X(j\Omega)$  是实函数.

(b)  $Y(j\Omega) = \frac{1}{2} [X(j\Omega) + X^*(-j\Omega)]$

4.18 (1) (a)  $y(x) = \cos 2\pi x$

(b)  $y(x) = 4\pi \cos 2\pi x + 3\pi \sin 6\pi x$ .

(c)  $y(x) = \frac{1}{2} \sin 6\pi x$

4.23 (a)  $H(j\Omega) = 1$   $\neq H(j\Omega) = -2 \tan^{-1} \frac{\Omega}{\alpha}$

$$h(x) = 2a e^{-ax} u(x) - \delta(x)$$

(b)  $b \neq a$  时  $y(x) = \frac{2a}{b-a} e^{-ax} u(x) + \frac{a+b}{a-b} e^{-bx} u(x)$

4.25 (a)  $H(j\Omega) = \frac{1}{2 + j\Omega}$   $h(x) = e^{-2x} u(x)$

(b)  $y(x) = (e^{-x} - e^{-2x}) u(x)$

4.37 (a)  $\frac{1}{3} \text{ms}$  (b)  $1 \text{ms}$  (c)  $2 \text{ms}$

(d)  $\frac{1}{9} \text{ms}$  (e)  $1 \text{ms}$  (f)  $0.5 \text{ms}$



4.38 (a)  $h(x) = u(x) - u(x-T)$

(c)  $H_r(\Omega) = \begin{cases} \frac{j\Omega T}{1 - e^{-j\Omega T}} & |\Omega| < \frac{\Omega_s}{2} = \frac{\pi}{T} \\ 0 & \text{其它 } \Omega \end{cases}$

$|H_r(\Omega)| = \frac{\Omega T}{2 \sin \frac{\Omega T}{2}} \quad \neq H_r(\Omega) = \frac{\Omega T}{2}$

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第五章

5.1 (a)  $\dot{A}_7 = \dot{A}_{-7} = \dot{A}_{14} = \frac{1}{2} \quad \dot{A}_3 = \frac{1}{2j} \quad \dot{A}_{-3} = \dot{A}_{18} = \frac{-1}{2j}$

对其余  $0 \leq k \leq 21$ .  $\dot{A}_k = 0$

(c)  $\dot{A}_0 = \frac{1}{4}(3 - \sqrt{2}) \quad k \neq 0 \text{ 时 } \dot{A}_k = \frac{1}{4}(-1)^{k+1} (1 + \sqrt{2} \cos \frac{k\pi}{2})$

$\dot{A}_1 = \frac{1}{4} \quad \dot{A}_2 = \frac{\sqrt{2}-1}{4} \quad \dot{A}_3 = \frac{1}{4}$

(e)  $\dot{A}_0 = \frac{2}{3} \quad 1 \leq k \leq 5 \text{ 时 } \dot{A}_k = \frac{1}{6} e^{-j\frac{\pi}{2}k} \frac{\sin(\frac{2\pi}{3}k)}{\sin(\frac{\pi}{6}k)}$

5.4 (a)  $\dot{A}_k e^{-j\frac{2\pi}{N}k n_0}$

(b)  $(1 - e^{-j\frac{2\pi}{N}k}) \dot{A}_k$

(c)  $\dot{A}_k^*$

(d)  $\dot{A}_{k-\frac{N}{2}}$  或  $\dot{A}_{k+\frac{N}{2}}$

(e)  $\begin{cases} \dot{A}_{\frac{k+N}{2}} & k \text{ 为奇} \\ 0 & k \text{ 为偶} \end{cases}$

(f)  $\frac{1}{m} \dot{A}_k \quad (k=0, 1, \dots, mN-1)$

5.6 (a)  $\frac{1}{16} \frac{e^{-j2\omega}}{1 - \frac{1}{4}e^{-j\omega}}$

(e)  $\frac{1 - ae^{-j\omega} \cos \omega_0}{1 - 2ae^{-j\omega} \cos \omega_0 + a^2 e^{-j2\omega}}$

(g)  $\frac{1}{1 - (\frac{1}{4}e^{-j\omega})^3}$

(j)  $\frac{e^{j3\omega} + e^{j4\omega} + e^{-j5\omega} + e^{-j6\omega}}{2(1 - e^{-j\omega} + e^{-j2\omega})}$

$$5.8 \text{ (a)} \quad \dot{A}_k = \frac{1}{4} + \frac{3}{8} \cos k\omega_0 + \frac{1}{4} \cos 2k\omega_0 + \frac{1}{8} \cos 3k\omega_0 \quad \left| \quad \omega_0 = \frac{\pi}{4} \right.$$

$$(b) \quad \mathcal{X}_1(e^{j\omega}) = 2 + 3 \cos \omega + 2 \cos 2\omega + \cos 3\omega$$

$$\mathcal{X}_2(e^{j\omega}) = 2 + \frac{3}{2} e^{-j\omega} + e^{-j2\omega} + \frac{1}{2} e^{-j3\omega} \\ + \frac{1}{2} e^{-j5\omega} + e^{-j6\omega} + \frac{3}{2} e^{-j7\omega}$$

$$5.9 \text{ (a)} \quad 6 \quad (b) \quad \neq \mathcal{X}(e^{j\omega}) = -2\omega \quad (c) \quad 2$$

$$(d) \quad 4\pi \quad (e) \quad 28\pi \quad 316\pi$$

$$5.10 \text{ (a)} \quad \text{图 (b) (g) 满足}$$

$$(b) \quad \text{图 (d) (e)}$$

$$(c) \quad \text{图 (a) (b) (d) (e) (f)}$$

$$(d) \quad \text{图 (b) (d) (e) (f) (g)}$$

$$(e) \quad \text{图 (b) (c) (g)}$$

$$5.11 \quad \mathcal{X}_1(n) = (-1)^n \mathcal{X}(n) \quad \mathcal{X}_2(n) = -j \frac{\pi}{2} n \mathcal{X}(n)$$

$$\mathcal{X}_3(n) = \mathcal{X}(n) - j \frac{\pi}{2} n \mathcal{X}(n) \quad \mathcal{X}_4(n) = [1 + (-1)^n] \mathcal{X}(n)$$

$$\mathcal{X}_5(n) = \mathcal{X}(-n) \left[ 1 + j \frac{\pi}{2} n \right] \quad \text{或} \quad \mathcal{X}(n) \left[ 1 + j \frac{\pi}{2} n \right]$$

$$5.34 \text{ (a)} \quad y(n) = \left[ 3 \left( \frac{3}{4} \right)^n - 2 \left( \frac{1}{2} \right)^n \right] u(n)$$

$$(b) \quad y(n) = \frac{2}{3} (-1)^n$$

$$(d) \quad y(n) = \frac{4}{5} \cos \frac{\pi}{2} n + \frac{2}{5} \sin \frac{\pi}{2} n$$

$$5.35 \text{ (a)} \quad y(n) = \frac{1}{8} + \frac{1}{4} \cos \frac{\pi}{4} n$$

$$(c) \quad y(n) = \frac{5}{8} + \frac{1+j\sqrt{2}}{8} \cos \frac{\pi}{4} n$$

$$5.36 \text{ (b)} \quad G(e^{j\omega}) = 1 + \frac{1}{2} e^{-j\omega} \quad g(n) = \delta(n) + \frac{1}{2} \delta(n-1)$$

$$y(n) = x(n) + \frac{1}{2} x(n-1)$$

$$(d) G(e^{j\omega}) = \frac{1 + \frac{5}{4}e^{-j\omega} - \frac{1}{8}e^{-j2\omega}}{1 - \frac{1}{4}e^{-j\omega} - \frac{1}{8}e^{-j2\omega}}$$

$$g(n) = \delta(n) - 2\left(-\frac{1}{4}\right)^n u(n) + 2\left(\frac{1}{2}\right)^n u(n)$$

$$y(n) - \frac{1}{4}y(n-1) - \frac{1}{8}y(n-2) = x(n) + \frac{5}{4}x(n-1) - \frac{1}{8}x(n-2)$$

$$(f) G(e^{j\omega}) = \frac{1 + \frac{5}{4}e^{-j\omega} - \frac{1}{8}e^{-j2\omega}}{1 - \frac{1}{2}e^{-j\omega}}$$

$$g(n) = \delta(n) + \frac{7}{4}\delta(n-1) + \frac{3}{4}\left(\frac{1}{2}\right)^{n-2} u(n-2)$$

$$\text{或 } \left(\frac{1}{2}\right)^n u(n) + \frac{5}{4}\left(\frac{1}{2}\right)^{n-1} u(n-1) - \frac{1}{8}\left(\frac{1}{2}\right)^{n-2} u(n-2)$$

$$\text{或 } -2\delta(n) + \frac{1}{4}\delta(n-1) + 3\left(\frac{1}{2}\right)^n u(n)$$

$$y(n) - \frac{1}{2}y(n-1) = x(n) + \frac{5}{4}x(n-1) - \frac{1}{8}x(n-2)$$

第六节

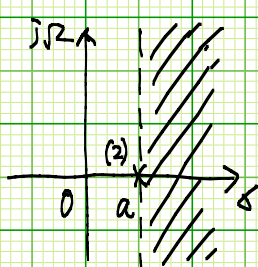
6.1 (b)  $\frac{1}{(s-a)^2} \quad \text{Re}\{s\} > a$

(c)  $-\frac{1}{s+a} \quad \text{Re}\{s\} < -a$

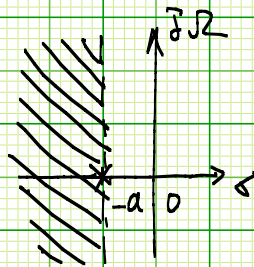
(f)  $\frac{\Omega_c}{(s+a)^2 + \Omega_c^2} \quad \text{Re}\{s\} > -a$

(h)  $\frac{-5}{(s+2)(s-3)} \quad -2 < \text{Re}\{s\} < 3$

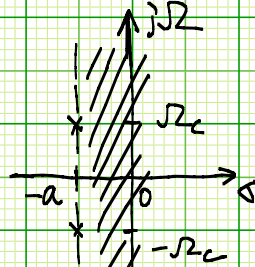
零极点图:



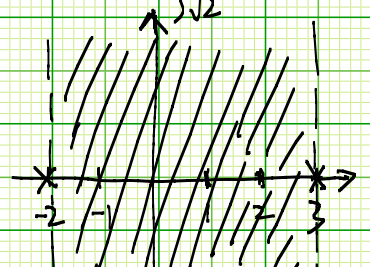
(b)



(c)



(f)



(h)

6.2 (b)  $\frac{1}{s} [1 + e^{-s} - e^{-2s} - e^{-3s}]$

ROC: 整个s平面



$$(e) \frac{2}{s^2 T} [1 - e^{-\frac{sT}{2}}]^2$$

整个s平面

$$(f) \sin \pi t \quad 0 < t < 1 \quad \frac{\pi [1 + e^{-s}]}{s^2 + \pi^2} \quad \text{整个s平面}$$

6.3	(a)	(a) $-1 < \operatorname{Re}\{s\} < 1$	(b) $\operatorname{Re}\{s\} < -1$	(c) $\operatorname{Re}\{s\} < -1$	(d) $\operatorname{Re}\{s\} > 1$
	(b)	$-3 < \operatorname{Re}\{s\} < 3$	$-3 < \operatorname{Re}\{s\} < 3$	$\operatorname{Re}\{s\} < -3$	$\operatorname{Re}\{s\} > 3$
	(c)	$\operatorname{Re}\{s\} > -1$	$-3 < \operatorname{Re}\{s\} < -1$	$\operatorname{Re}\{s\} < -3$	$\operatorname{Re}\{s\} > -1$

6.4 (a)  $\frac{k(s-1)}{(s+3)(s+1)}$  可化为  $\frac{A}{s+3} + \frac{B}{s+1}$

$\operatorname{Re}\{s\} < -3$	左边信号
$-3 < \operatorname{Re}\{s\} < -1$	双边信号
$\operatorname{Re}\{s\} > -1$	右边信号

(b)  $\frac{k(s+1)}{s^2+1}$

$\operatorname{Re}\{s\} < 0$	左边信号
$\operatorname{Re}\{s\} > 0$	右边信号

(c)  $\frac{k(s^2+1)}{(s+2)(s+1)(s-1)}$

$\operatorname{Re}\{s\} < -2$	左边信号
$-2 < \operatorname{Re}\{s\} < -1$	双边信号
$-1 < \operatorname{Re}\{s\} < 1$	
$\operatorname{Re}\{s\} > 1$	右边信号

6.7 (d)  $\frac{1}{1-e^{-4s}} \frac{(1-e^{-s})^2}{s^2} \quad \operatorname{Re}\{s\} > 0$

(e)  $\frac{\Omega_c}{1-e^{-\frac{2\pi}{\Omega_c}s}} \frac{1+e^{-\frac{\pi}{\Omega_c}s}}{s^2+\Omega_c^2} \quad \operatorname{Re}\{s\} > 0$

6.8 (b)  $-\frac{1}{2} [e^{-t} + 3e^{-3t}] u(1-t)$

(d)  $[e^{-2t} - 2e^{-3t}] u(1-t)$

(f)  $[e^{-t} \cos 2t] u(t)$

6.10 (a)  $H(s) = \frac{1}{s+3} \quad \operatorname{Re}\{s\} > -3$

$x(t) = u(t) \quad y(t) = \frac{1}{3} (1 - e^{-3t}) u(t)$

$x(t) = e^{-t} u(t) \quad y(t) = \frac{1}{2} (e^{-t} - e^{-3t}) u(t)$

6.12 (a)  $H(s) = \frac{-3(s+2)}{(s+6)(s-1)} \quad \text{Re}\{s\} > 1$

$$y(x) = \left(1 + \frac{2}{7}e^{-6x} - \frac{9}{7}e^x\right) u(x)$$

(c)  $H(s) = \frac{-2}{(s+2)(s-1)} \quad -2 < \text{Re}\{s\} < 1$

$$y(x) = \left(1 - \frac{1}{3}e^{-2x}\right) u(x) + \frac{2}{3}e^x u(-x)$$

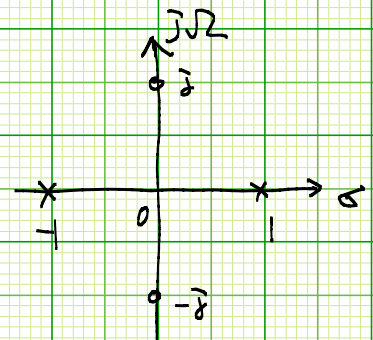
6.15 (a)  $H(s) = \frac{1}{s+2} \quad \text{Re}\{s\} > -2$

(b)  $h(x) = e^{-2x} u(x)$

(c)  $y(x) = e^{-x}$

6.17 (a) 零极点图

$$H(s) = \frac{k(s^2+1)}{(s+1)(s-1)}$$



(b)  $h(x) = k [ \delta(x) - e^{-x} u(x) - e^x u(-x) ]$

(c)  $h(x) = k [ \delta(x) - e^{-x} u(x) + e^x u(x) ]$

6.19 (b)  $y(x) = \frac{1}{2}(1 + e^{-2x}) u(x)$

(d)  $y(x) = \left[ \frac{9}{2} - (3+3x)e^{-x} - \frac{1}{2}e^{-2x} \right] u(x)$

6.22 (双主)  $i_L(x) = \frac{5}{3} \left[ 3u(x) - 2e^{-\frac{1}{2}x} \cos\left(\frac{\sqrt{3}}{2}x\right) u(x) + \frac{2}{\sqrt{3}}e^{-\frac{1}{2}x} \sin\left(\frac{\sqrt{3}}{2}x\right) u(x) \right]$

$$i_C(x) = -\frac{20}{3\sqrt{3}} e^{-\frac{1}{2}x} \sin\left(\frac{\sqrt{3}}{2}x\right) u(x)$$

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## 第七章

7.2 (a)  $x(n) = \frac{k}{2} \left[ \left(-\frac{3}{2}\right)^n - \left(\frac{1}{2}\right)^n \right] u(-n-1)$

(b)  $x(n) = \frac{k}{2} \left[ \left(\frac{1}{2}\right)^n - \left(-\frac{3}{2}\right)^n \right] u(n)$

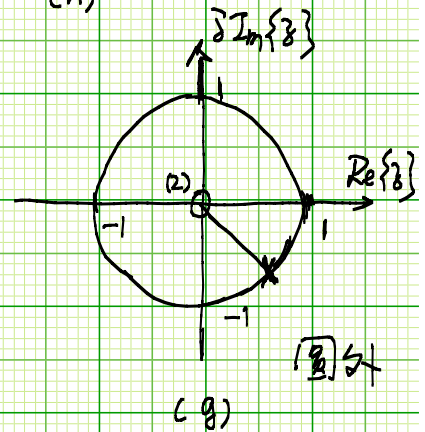
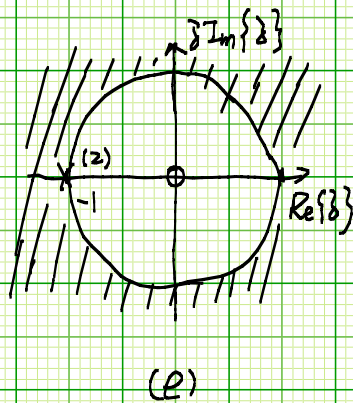
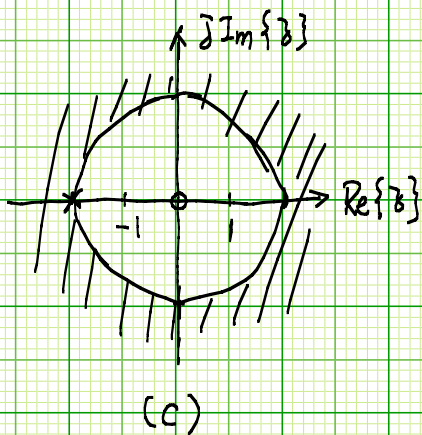
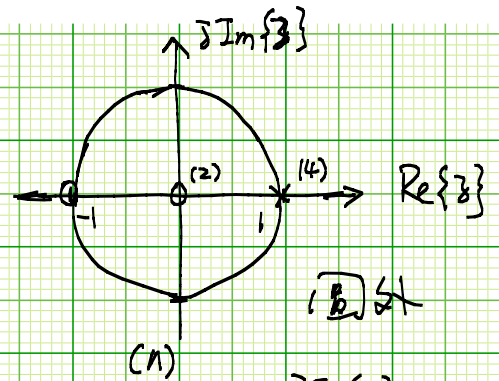
(c)  $x(n) = \frac{k}{2} \left[ \left(-\frac{3}{2}\right)^n u(-n-1) + \left(\frac{1}{2}\right)^n u(n) \right]$

7.3 (c)  $\frac{1}{1+2z^{-1}} \quad |z| > 2$

(e)  $\frac{-z^{-1}}{(1+z^{-1})^2} \quad |z| > 1$

(g)  $\frac{e^{j\omega_0} z}{1 - e^{-j\omega_0} z^{-1}} \quad |z| > 1 \quad \text{不含 } \infty$

(h)  $\frac{z^{-1} + z^{-2}}{(1 - z^{-1})^4} \quad |z| > 1$



7.4 (c)  $Z(z) \cdot \frac{1}{1-z^{-1}} \quad \text{ROC: } \bigcup R \cap |z| > 1$

(e)  $Z\left(\frac{z}{a}\right) \frac{1}{1-z^{-1}} \quad \text{ROC: } |a|R \cap |z| > 1$

(g)  $Z(z^2) \quad \text{ROC: } \sqrt{R}$

7.7 (b)  $\frac{1}{8} - \frac{3}{32}z + \frac{23}{128}z^2 - \frac{63}{512}z^3 + \dots$

(d)  $-4z + 32z^2 - 160z^3 + 704z^4 + \dots$

7.10 (b)  $\left(-\frac{1}{2}\right)^n u(n) \quad (c) -2u(-n-1) - 2\left(\frac{1}{2}\right)^n u(n)$

(f)  $\left[\cos \omega_0 n + \frac{\cos \omega_0 + 1}{\sin \omega_0} \sin \omega_0 n\right] u(n)$

(h)  $\left[\frac{35}{3} \left(\frac{4}{5}\right)^n + \frac{4}{3} \left(-\frac{2}{5}\right)^n - 13 \left(\frac{3}{5}\right)^n\right] u(n)$

7.11 (a) 可能的 ROC ①  $|z| < \frac{1}{3}$  ②  $\frac{1}{3} < |z| < \frac{4}{3}$  ③  $|z| > \frac{4}{3}$

(b) ①  $-\frac{1}{5}(-\frac{1}{3})^n u(-n-1) - \frac{4}{5}(\frac{4}{3})^n u(-n-1)$

②  $\frac{1}{5}(-\frac{1}{3})^n u(n) - \frac{4}{5}(\frac{4}{3})^n u(-n-1)$

③  $\frac{1}{5}(-\frac{1}{3})^n u(n) + \frac{4}{5}(\frac{4}{3})^n u(n)$

(c) 第②种序列存在 DTFT

7.14 ①  $h(n) = [4 \cdot (-\frac{1}{2})^n - 3 \cdot (-\frac{1}{4})^n] u(n)$  因果稳定

②  $h(n) = -4 \cdot (-\frac{1}{2})^n u(-n-1) - 3(-\frac{1}{4})^n u(n)$  非因果. 非稳定.

③  $h(n) = -4(-\frac{1}{2})^n u(-n-1) + 3(-\frac{1}{4})^n u(-n-1)$  反因果. 非稳定

7.16 (a)  $H(z) = \frac{1}{1 + \frac{1}{3}z^{-1}} \quad |z| > \frac{1}{3}$

(b)  $h(n) = (-\frac{1}{3})^n u(n)$

(c)  $y(n) = \frac{1}{4}(-\frac{1}{3})^n u(n) + \frac{3}{4}u(n)$

(d)  $x(n) = -(-\frac{1}{2})^n u(n)$

7.18 (a)  $H(z) = \frac{4}{3} \frac{z^{-2}}{(1 + \frac{1}{3}z^{-1})(1 - z^{-1})} \quad |z| > 1$

(b)  $h(n) = \frac{1}{3}(-\frac{1}{3})^{n-2} u(n-2) + u(n-2)$

或  $-4\delta(n) + u(n) + 3(-\frac{1}{3})^n u(n)$

(c)  $y(n) + \frac{2}{3}y(n-1) + \frac{1}{3}y(n-2) = \frac{4}{3}x(n-2)$

(d)  $y(n) = \frac{1}{3}u(n) - \frac{3}{5}(-\frac{1}{3})^n u(n) + \frac{4}{15}(-2)^n u(n)$

(e)  $h(n) = -4\delta(n) - u(-n-1) + 3(-\frac{1}{3})^n u(n)$