[Chapter 07] 연습문제 정답

7.1

[풀이] $\frac{A}{s^2}+\frac{B}{s}$

7.2

[풀이] $\frac{a4!}{s^5}+\frac{4ab}{s^3}+\frac{b^2}{s}$

7.3

[풀이] $\frac{AB}{s^2+B^2}+\frac{as}{s^2+b^2}$

7.4

[풀이] $\frac{(\cos a+\sin a)s}{s^2+1}+\frac{\cos a-\sin a}{s^2+1}$

7.5

[풀이] $\frac{1}{s}+\frac{s}{2(s^2+4A^2)}-\frac{s}{2(s^2+4B^2)}$

7.6 $\sinh^2 t+\cosh^2 2t$

[풀이] $\frac{1}{4}\left(\frac{1}{s-2}+\frac{1}{s+2}+\frac{1}{s-4}+\frac{1}{s+4}\right)$

7.7

[풀이] $F(s)=\frac{2(e^{-s}-e^{-2s})}{s}$

7.8

[풀이] $2\pi \cdot \dfrac{1}{(s^2+\dfrac{\pi^2}{4})}(1+e^{-2s}) = \dfrac{2\pi}{(s^2+\dfrac{\pi^2}{4})}(1+e^{-2s})$

7.9

[풀이] $F(s) = \dfrac{a}{s} + \dfrac{e^{-as}-1}{s^2}$

7.10

[풀이] $-\dfrac{e^{-s}}{s} - \dfrac{e^{-s}}{s^2} + \dfrac{1}{s^2}$

7.11

[풀이] $A\sin At$

7.12

[풀이] $\dfrac{a}{2}t^2 + bt + c$

7.13

[풀이] $4\cos 4t + \dfrac{7}{4}\sin 4t$

7.14

[풀이] $3\cosh 3t - \sinh 3t$

7.15

[풀이] $\dfrac{1}{A-B}(e^{At} - e^{Bt})$

7.16

[풀이]

$$\sin\frac{b}{a}\pi t$$

7.17

증명 생략

7.18

증명 생략

7.19

[풀이] $\dfrac{2A^2}{s(s^2+4A^2)}$

7.20

[풀이] $\dfrac{1}{s}\left(\dfrac{s^2-2a^2}{s^2-4a^2}\right)$

7.21

[풀이] $\dfrac{1}{(s-B)^2}$

7.22

[풀이] $\dfrac{2bs}{(s^2-b^2)^2}$

7.23

증명 생략

7.24

증명 생략

7.25

[풀이] $\frac{1}{2}(1-e^{-2t})$

7.26

[풀이] $-\frac{1}{2}t-\frac{3}{4}(e^{-2t}-1)$

7.27

[풀이] $-\frac{2}{9}(\cos 9t-1)$

7.28

[풀이] $\frac{1}{2}(t-\frac{1}{2}+\frac{1}{2}e^{-2t})$

7.29

[풀이] $\frac{6}{4(s+5)^4}$

7.30

[풀이] $\frac{a\cos b+(s+1)\sin b}{(s+1)^2+a^2}$

7.31

[풀이] $\frac{-s+5}{(s+4)^2+9}$

7.32

[풀이] $f(t)=3(6t+1)e^{6t}$

7.33

[풀이] $f(t)=2e^{-\frac{1}{3}t}\sin\frac{1}{2}t$

7.34

[풀이] $f(t)=2e^{-\omega t}\cosh 4t$

7.35

[풀이] $y(t)=e^{-2t}(t+2)$

7.36

[풀이] $y(t)=\frac{5}{3}e^{-t}\sin 3t$

7.37

[풀이]

$y(t)=e^{2t}-\frac{1}{4}t+\frac{1}{8}\sinh 2t$

7.38

[풀이] $\therefore \quad y(t)=\begin{cases}0 & (t<1)\\ \sin(t-1) & (t>1)\end{cases}$

7.39

[풀이] $y(t)=e^{-2t}\cos 2t\,u(t)+\frac{1}{2}e^{-2(t-2\pi)}\sin 2(t-2\pi)u(t-2\pi)$

7.40

[풀이]

$$\therefore\ y(t)=\begin{cases} e^{-2t}-e^{-3t} & (0<t<1) \\ e^{-2t}-e^{-3t}+\frac{1}{6}-\frac{1}{2}e^{-2(t-1)}+\frac{1}{3}e^{-3(t-1)} & (1<t<2) \\ e^{-2t}-e^{-3t}+\frac{1}{6}-\frac{1}{2}e^{-2(t-1)}+\frac{1}{3}e^{-3(t-1)}+e^{-2(t-2)}-e^{-3(t-2)} & (t>2) \end{cases}$$

7.41

[풀이] $\therefore\quad i(t)=\begin{cases} \frac{E_0}{R}e^{-\frac{t-a}{RC}} & (a<t<b) \\ \frac{E_0}{R}\left(e^{\frac{a}{RC}}-e^{\frac{b}{RC}}\right)e^{-\frac{t}{RC}} & (t>b) \end{cases}$

7.42

[풀이] $i(t)=-\frac{10}{101}\{e^{-10(t-\pi)}+\cos(t-\pi)-10\sin(t-\pi)\}u(t-\pi)$

7.43

[풀이] $\therefore\ i(t)=\begin{cases} 1-\cos t\,, & 0<t<a \\ \cos(t-a)-a\sin(t-a)-\cos t\,, & t>a \end{cases}$

7.44

[풀이] $\frac{e^{-s}}{s^2}+\frac{e^{-s}}{s}$

7.45

[풀이]

$\therefore\quad F(s)=e^{-2s}\left(\frac{6}{s^4}+\frac{12}{s^3}+\frac{12}{s^2}+\frac{8}{s}\right)$

7.46

[풀이] $\frac{se^{-\frac{\pi}{2}s}}{s^2+1}$

7.47

[풀이] $\frac{e^{-b(s-a)}}{s-a}$

7.48

[풀이] $e^{t}-1$

7.49

[풀이] $\frac{1-\cos at}{a^{2}}$

7.50

[풀이] $-\frac{1}{a}t+\frac{1}{a^{2}}(e^{at}-1)$

7.51

[풀이] $\frac{1}{a^{3}}(at-\sin at)$