공 학 수 학 보충문제 (제2장) 정 답

출처 : Kreyszig 공업수학, 개정8판, 문제풀이 해설, 범한서적㈜, 2001.

2-1 기본적인 정의와 성질

■ 연습문제 2.2

18. 1차독립　19. 1차종속　20. 1차독립　21. 1차종속
22. 1차독립　23. 1차독립　24. 1차종속　25. 1차독립
26. 1차종속

2-2 상계수를 갖는 제차 미분방정식

■ 연습문제 2.2

1. $y = c_1 e^{\frac{x}{2}} + c_2 e^{-\frac{3}{2}x}$
2. $y = (c_1 + c_2 x)e^{-1.6x}$
3. $y = c_1 + c_2 e^{\frac{9}{2}x}$
4. $y = c_1 e^{\sqrt{8}x} + c_2 e^{-\sqrt{8}x}$
5. $y = c_1 e^{-4x} + c_2 e^{-5x}$
6. $y = c_1 e^{\frac{\pi}{4}x} + c_2 e^{-\frac{\pi}{4}x}$
7. $y = (c_1 + c_2 x)e^{\frac{5}{3}x}$
8. $y = c_1 e^{-x} + c_2 e^{\frac{2}{5}x}$
9. $y = (c_1 + c_2 x)e^{-kx}$
10. $y = 6e^{2x} + 4e^{-3x}$
11. $y = (1 + 3x)e^{-2x}$
12. $y = 3e^{-3x}$
13. $y = 0.3e^{-\frac{1}{4}x} - 0.5e^{\frac{1}{2}x}$
14. $y = e^{-\frac{5}{2}x} - e^{\frac{5}{2}x}$
15. $y = 2e^{-1.3x}$
16. $y = \frac{k+1}{2k}e^{kx} + \frac{k-1}{2k}e^{-kx}$
17. $y = e^{-\frac{1}{2}x}$

■ 연습문제 2.3

5. $y = (c_1 + c_2 x)e^{-0.8x}$
6. $y = c_1 e^{3x} + c_2 e^{-4x}$
7. $y = e^{\frac{1}{4}x}(c_1 \cos\frac{x}{2} + c_2 \sin\frac{x}{2})$
8. $y = e^{-2x}(c_1 \cos\omega x + c_2 \sin\omega x)$
9. $y = c_1 e^{3\pi x} + c_2 e^{-3\pi x}$
10. $y = e^{\sqrt{2}x}(c_1 \cos\frac{x}{\sqrt{2}} + c_2 \sin\frac{x}{\sqrt{2}})$
11. $y = (c_1 + c_2 x)e^{\sqrt{2}x}$
12. $y = e^{-kx}(c_1 \cos\frac{x}{k} + c_2 \sin\frac{x}{k})$
13. $y = (4 - 3x)e^{-\frac{x}{3}}$
14. $y = -\frac{1}{2}e^{-2x}\cos\frac{x}{2}$
15. $y = 2e^{5x} - 2e^{-5x}$
16. $y = e^{-0.2x}(\cos 0.5x - 2\sin 0.5x)$
17. $y = 3e^{-x} - 7e^{2x}$
18. $y = e^{x}(-2\cos 2\pi x + 3\sin 2\pi x)$
19. $y = 3\cos 2x + c_2 \sin 2x$
20. $y = \frac{1}{2}e^{5x} + \frac{1}{2}e^{-5x}$
21. $y = e^{-x}\cos x$
22. $y = e^{-\frac{x}{3}-1}$

2-3 Euler방정식

■ 연습문제 2.6

2. $y = c_1 x^2 + c_2 x^3$
3. $y = c_1 x^{-4} + c_2 x^5$
4. $y = c_1 + \frac{c_2}{x}$
5. $y = (c_1 + c_2 \ln x)x^{-1.8}$
6. $y = x[c_1 \cos(\ln x) + c_2 \sin(\ln x)]$
7. $y = c_1 \cos(\ln x) + c_2 \sin(\ln x)$

14. $y = c_1 x + c_2 x^2$

15. $y = (2 - \ln x) x^{-5/2}$

16. $y = 2\cos(3\ln x)$

2-4 차수내림과 1계 도함수의 소거

(생략)

2-5 비제차 미분방정식의 성질

■ 연습문제 2.8

1. $y = c_1 e^x + c_2 e^{-x} + e^{-3x}$

2. $y = c_1 e^x + c_2 e^{-x} + e^{-3x}$

3. $y = c_1 e^{-x} + c_2 e^{-2x} + 2x^2 - 6x + 7$·

4. $y = e^x(c_1 \cos 2x + c_2 \sin 2x) + x^3$

9. $y = -\cos x + 6\sin x + 2x$

10. $y = 0.4 e^x + 0.6 e^{-x} - \cos x$

11. $y = -e^{-x} + x e^x$

2-6 미정계수법

■ 연습문제 2.9

1. $y = c_1 \cos 2x + c_2 \sin 2x - \frac{1}{5}\sin 3x$

2. $y = c_1 e^x + c_2 e^{-x} + x e^x + 2e^{2x}$

3. $y = c_1 + c_2 e^{-3x} + 4\cosh 4x - 3\sinh 4x$

4. $y = c_1 e^{-x} + c_2 e^{2x} + x e^{2x}$

5. $y = e^{-x}(c_1 \cos 3x + c_2 \sin 3x) + \frac{5}{2}x^2 - x$

6. $y = c_1 e^{-3x} + c_2 e^{-x/3} + 3x - 10 + \frac{1}{2}\sin x$

7. $y = c_1 e^{-3x} + c_2 e^{2x} + x^3$

8. $y = (c_1 + c_2 x)e^{-3x} + e^{-x}(6\cos x + 8\sin x)$

9. $y = c_1 e^{-7x} + c_2 e^{5x} + x e^{5x} - \frac{1}{10}\cos 5x - \frac{3}{5}\sin 5x$

10. $y = c_1 e^{-\frac{1}{2}x} + c_2 e^{\frac{3}{2}x} + \frac{32}{5}\cosh 2x + \frac{52}{5}\sinh 2x$

11. $y = (c_1 + c_2 x + \frac{1}{2}x^2)e^{-5x}$

12. $y = c_1 e^{3x} + c_2 e^{-6x} + \frac{1}{2}x e^{3x} + \frac{1}{4}e^{-3x}$

13. $y = (c_1 + c_2 x)e^{-4x} + \frac{1}{2}e^{4x} + 16x^2 e^{-4x}$

14. $y = e^{2x}(c_1 \cos 4x + c_2 \sin 4x) + 4\cos x + 19\sin x$

15. $y = 4e^{-2x} + x^4$

16. $y = e^{3x}(\cos x - \sin x) + e^{3x}$

17. $y = -\frac{1}{16}e^{2x} + \frac{1}{16}e^{-2x} + \frac{1}{2}x - \frac{1}{4}x e^{-2x}$

18. $y = \cos 3x + x\sin 3x$

19. $y = (x + 2x^2)e^{-0.6x}$

20. $y = x^2 e^{1.4x}$

21. $y = 5 + 3e^{-x} + \frac{1}{3}x^3 + 2x$

22. $y = 2e^{-x/2}\cos 3x + 4 + e^{-x}$

2-7 변수변분법

■ 연습문제 2.10

1. $y = (c_1 + c_2 x - x + x\ln|x|)e^{2x}$

2. $y = c_1 \cos 3x + c_2 \sin 3x + \frac{1}{9}\cos 3x \ln|\cos 3x| + \frac{x}{3}\sin 3x$

3. $y = c_1 e^{-x} + c_2 x e^{-x} - e^{-x}\cos x$

4. $y = c_1 \cos 3x + c_2 \sin 3x - \frac{x}{3}\cos 3x + \frac{1}{9}\sin 3x \ln|\sin 3x|$

5. $y = c_1 e^{x} + c_2 x e^{x} + \frac{1}{2x}e^{x}$

6. $y = e^{2x}(c_1 \cos x + c_2 \sin x) + (-x\cos x + \sin x \ln|\sin x|)e^{2x}$

11. $y = c_1 x^2 + c_2 x^3 + \frac{1}{2}x^{-4}$

12. $y = c_1 + c_2 x^2 + x^2 e^{x}$

13. $y = c_1 x^{1/2} + c_2 x^{-3/2} + \frac{1}{3}x^2 - \frac{1}{3}x^3$

2-8 초기값문제와 경계값문제

■ 복습문제

16. $y = e^{-3x}(c_1 \cos\frac{x}{2} + c_2 \sin\frac{x}{2})$

17. $y = c_1 e^{2x} + c_2 e^{-x/2} + x^2 - 3x$

18. $y = c_1 x^3 + c_2 x^{-3}$

19. $y = (c_1 + c_2 \ln x)x^2 + 3$

22. $y = (c_1 + c_2 x + x^2)e^{-x}$

23. $y = (c_1 \cos x + c_2 \sin x - \cos 2x)e^{-x}$

31. $y = 5\cos 4x - \frac{3}{4}\sin 4x + e^{-x}$

32. $y = 3e^{x} - 5e^{2x} + 3\cos x + \sin x$

33. $y = 10x^2 - 5x^3 - x^2 \sin \pi x$

34. $y = e^{-2x}(\cos \omega x + \sin \omega x)$

35. $y = \cos 2x + 2\sin 2x + e^{-2x} + x^2$