

MSE, 미적분학

## [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 07 연습문제 답안

### 《Section 7.2》

1.  $\frac{1}{2}e^{x^2} + C$

2.  $\frac{1}{9}(3x^2 + 7)^{3/2} + C$

3.  $\frac{2}{15}(3 + 5x)^{3/2} + C$

4.  $\frac{2}{7}\sqrt{3 + 7x} + C$

5.  $\frac{1}{15}\tan^{15}x + C$

6.  $\frac{1}{3(x+1)^3} + \frac{1}{2(x+1)^4} + C$

7.  $\sqrt{1 + 2\sec\theta} + C$

8.  $\ln|\ln x| + C$

9.  $\frac{1}{2}(\sin x^2 - x^2 \cos x^2) + C$

10.  $\frac{1}{24}(1 + 3x)^8 + C$

11.  $-\frac{1}{3}\ln|2 - 3x| + C$

12.  $\frac{1}{2(2-x)^2} + C$

13.  $2\sin(\frac{1}{2}\theta - 1) + C$

14.  $e^{-x}(-x - 1) + C$

15.  $-\frac{1}{4}\cos^4 x + C$

16.  $-e^{-x} + C$

17.  $\frac{1}{9}(\sin 3x - 3x\cos 3x) + C$

18.  $\frac{1}{2\pi}(\pi x - \sin \pi x \cos \pi x) + C$

19.  $3(\sin x - x\cos x) + C$

20.  $\frac{1}{27}(9x^2 - 2)\sin 3x + \frac{6}{27}x\cos 3x + C$

21.  $\frac{1}{2}(2x + 3)\ln(2x + 3) - \frac{1}{2}(2x + 3) + C$

22.  $\ln|\sec x + \tan x| + C$

23.  $\frac{1}{\sqrt{3}}\tan^{-1}\sqrt{3}x + C$

24. (a)  $x\tan^{-1}3x - \frac{1}{6}\ln(1 + 9x^2) + C$

(b) 아직 연산할 수 없다.

25.  $-\ln|\cos x| + C$

26.  $\ln|\sec x + \tan x| + C$

27.  $\frac{1}{2}x - \frac{1}{4}\sin 2x + C$

## 《Section 7.3》

1.  $\sin^{-1} \frac{x-3}{\sqrt{11}} + C$

2.  $\frac{1}{\sqrt{2}} \ln|x + \frac{1}{4}| + \sqrt{(x + \frac{1}{4})^2 - \frac{1}{16}} + C$

3.  $\frac{1}{\sqrt{3}} \ln|x + \sqrt{x^2 - \frac{5}{3}}| + C$

4.  $\frac{1}{3}x^3 - 4x + \ln(x^2 + 4) + 8\tan^{-1} \frac{1}{2}x + C$

5.  $\frac{1}{3}(x^2 + 2x)^{3/2} - \frac{1}{2}(x + 1)\sqrt{x^2 + 2x} + \frac{1}{2}\ln|x + 1 + \sqrt{x^2 + 2x}| + C$

6.  $\frac{1}{2}x - \frac{3}{2}\ln|2x - 6| + C$

7.  $x - \tan^{-1}x + C$

# 《Section 7.4》

1.
  - (a)  $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x+1} + \frac{E}{2x+3}$
  - (b)  $\frac{A}{x - (-1 + \sqrt{3})} + \frac{B}{x - (-1 - \sqrt{3})} + \frac{Cx + D}{x^2 - 2x + 2}$
  
2.
  - (a)  $\frac{-2\sqrt{3}}{x + \sqrt{3}} + \frac{2\sqrt{3}}{x - \sqrt{3}}$
  - (b)  $\frac{1/11}{x-4} - \frac{2/11}{2x+3}$
  - (c)  $\frac{-2x+1}{x^2+1} + \frac{2}{x-2}$
  - (d)  $\frac{2}{x-2} + \frac{7}{(x-2)^2}$
  
3.
  - (a)  $-\ln|2-x| + \ln|x+1| + C$
  - (b)  $\ln|x+1| - \ln|2-x| + C$
  
4.
  - (a)  $2\ln|x-1| - \ln|2-x| + C$
  - (b)  $2\ln|x+1| + 2\ln|x-1| - 2\ln(x^2+1) + C$
  - (c)  $-\frac{2}{9}\ln|x| + 1/3x + \frac{2}{9}\ln|2x-3| + C$
  
5.  $-\frac{1}{a^2}(\ln|a+bx| - \ln|x|) + \frac{1}{a(a+bx)} + C$
  
6.  $x + \frac{1}{3}\ln|x+1| - \frac{16}{3}\ln|x+4|$

## 《Section 7.5》

1.      (a)  $xe^x - e^x + C$   
          (b)  $x \tan^{-1} x - \frac{1}{2} \ln(1+x^2) + C$   
          (c)  $x \sin^{-1} x + \sqrt{1-x^2} + C$
  
2.      (a)  $\frac{1}{2} x [\cos(\ln x) + x \sin(\ln x)] + C$   
          (b)  $x^2 e^x - 2x e^x + 2e^x + C$   
          (c)  $\frac{1}{2} x^2 \tan^{-1} x - \frac{1}{2} x + \frac{1}{2} \tan^{-1} x + C$
  
3.       $\frac{1}{2} (\sec x \tan x + \ln |\sec x + \tan x|) + C$
  
4.       $-\frac{1}{2} x e^{-x^2} + \frac{1}{2} Q(x) + C$

《Section 7.6》

1.  $x^n e^x - n \int x^{n-1} e^x dx$

2.  $\frac{\tan^{n-1} x}{n-2} - \int \tan^{n-2} x dx$

3.  $x(\ln x)^3 - 3x(\ln x)^2 + 6(x \ln x - x) + C$

4.  $\frac{\sin^{m-1} x \cos^{n-1} x}{m-2+n} + \frac{n-1}{m-2+n} \int \sin^{m-2} x \cos^{n-2} x dx$

5. 새로운 적분에는 분자의  $x$ 가 본래 식과 다르므로

6. (a)  $\frac{1}{2} \sin^2 x + C$

(b)  $-\frac{1}{13} \cos^{13} x + C$

(c)  $\frac{3}{4} \left[ \frac{1}{2} \sec x \tan x + \frac{1}{2} \ln |\sec x + \tan x| \right] + C$

(d)  $\frac{1}{3} \tan^3 x - (\tan x - x) + C$

(e)  $-1/\sin x + C$

(f)  $\frac{1}{2} \sin^3 x \sec^2 x - \frac{1}{2} (-\sin x + \ln |\sec x + \tan x|) + C$

(g)  $\frac{1}{5} \sin^5 x - \frac{1}{7} \sin^7 x + C$

(h)  $-\frac{1}{12} \sin^3 3x \cos 3x + \frac{1}{8} (3x - \sin 3x \cos 3x) + C$

7.  $-\frac{\cos^{99} x}{99} \left[ 1 - \frac{99}{101} \cos^2 x \right]$



《Section 7.7》

$$\begin{aligned}
 1. \quad & \text{(a)} \ln|x + \sqrt{x^2 - a^2}| + K \\
 & \text{(b)} \frac{1}{2}a^2 \arcsin x/a + \frac{1}{2}x \sqrt{a^2 - x^2} + C \\
 & \text{(c)} \sqrt{a^2 + x^2} - a \ln \left| \frac{\sqrt{a^2 + x^2}}{x} + \frac{a}{x} \right| + C
 \end{aligned}$$

$$2. \quad -\frac{\sqrt{3-x^2}}{x} - \sin^{-1} \frac{x}{\sqrt{3}} + C$$

$$3. \quad \frac{1}{5} \frac{\sqrt{x^2-5}}{x} + C$$

$$4. \quad \frac{1}{14\sqrt{7}} \left( \tan^{-1} \frac{x}{\sqrt{7}} + \frac{x\sqrt{7}}{7+x^2} \right) + C$$

$$5. \quad \frac{x}{a^2 \sqrt{a^2 + x^2}} + C$$

## 《Section 7.8》

1.  $u = \sqrt{x}$
2.  $u = 1 - x^2$
3.  $a = \sqrt{3}$
4.  $u = 2x + 3$
5.  $u = x, dv = (x-1)^{20} dx$
6.  $-e^{-x} + C$
7. 긴 나눗셈
8.  $u = 4 - x^2$
9.  $x^2 + 9x + C$
10. 공식 19
11. 공식 9
12.  $u = 3x$  적용 후 공식 31
13. 공식 11
14.  $u = \sqrt{2}x$  적용 후, 공식 21
15. 부분적분
16. 긴 나눗셈
17. 공식 52(b) 적용 후, 공식 42 적용.  $\cos^4 x = (1 - \sin^2 x)^2$

18.  $u = \pi x$

19.  $u = 3x + 1$

20.  $u = 9 + 4x^3$

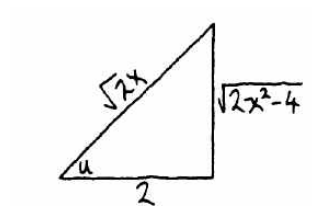
21.  $\tan x - \sin x \cos x$

22.  $u = 1 - x^2$

23.  $u = 9 + 4x$

24.  $\int \sec^2 x dx$

25.



26.  $\sin^4 x = (1 - \cos^2 x)^2, u = \cos x$

27.  $x + 4/x + C$

28. 공식 43

29.  $u = 2x + 1$

30.  $u = x^2$

31. 공식 52(c)

32. 공식 50

33.  $u = \sqrt{3}x$

34.  $u = 3x$

35.  $\frac{1}{2}x - \frac{3}{4}\ln|2x+3| + C$

36.  $u = 5x$

37.  $u = 2 - r^2$

38. 공 식 42

39.  $u = \cos x$

40.  $2x + C$

41.  $u = 2x$

42.  $2x + 3\ln|x| + C$

43. 공 식 46

44.  $-\frac{1}{2}\pi\cos(2x/\pi)$

45.  $u = \cos 2x$

46.  $\frac{1}{5}\ln|5x-2| + C$

47. 긴 나눗셈

48.  $u = x^2 + 7$

49.  $u = \cos x$

50.  $\frac{1}{2}x^2\sin^{-1}x - \frac{1}{2}\int \frac{x^2dx}{\sqrt{1-x^2}}$

51.  $u = x^2$

52. 부분 적분

53. 공식 61

54.  $u = 2x + 3$

55.  $u = x, dv = (x-1)^{20} dx$

56.  $-e^{-x} + C$

57.  $-\frac{2}{3}(3-x)^{3/2}$

58.  $-\frac{3}{5}(2-\frac{1}{3}x)^5$

59.  $u = e^x, du = e^x dx$

60.  $u = \cos x$

61.  $u = \sqrt{3}x$

62. 공식 24

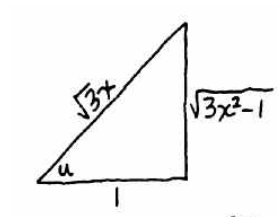
63.  $1(b)$

64.  $u = 4x + 5$

65.  $u = \frac{1}{2}\theta$

66.  $u = 1 + x^2$

67.



68.  $52(a)$

69.  $52(b)$

70.  $u = 2x$

71.  $x + 2e^x + \frac{1}{2}e^{2x}$

72.  $u = \cos x$

73. 완전 제곱식

74.  $u = \cos 2x$

75. 부분적분

76.  $u = 2 + 3x$

77. 공식 64

78.  $\int \frac{x dx}{2x^2 + x + 1} + \int \frac{4 dx}{2x^2 + x - 1}$

79.  $u = (\ln x)^3$

80.  $u = 3x$

81.  $u = x^3$

82.  $u = 2 + \cos x$

83. 공식 40

84.  $\int \cos x dx - \int \cos x \sin^2 x dx$

85.  $u = \cos x$

《Section 7.9》

1. (a)  $\frac{1}{3} \int_6^{15} \sin^5 \frac{1}{3} u du$

(b)  $\int_0^3 e^u \sin u du$

(c)  $-\int_{\pi/2}^{\pi/6} \frac{\cos^2 u}{\sin u} du$

2. (a)  $\frac{1}{66} (47^{11} - 11^{11})$

(b)  $-e^{-x} \cos x|_0^\infty - \int_0^\infty e^{-x} \cos x dx$

(c)  $\frac{1}{6}$

(d)  $\pi/16$

(e)  $\frac{1}{3} e^8$

(f)  $8\sqrt{8}/3 - 8/3$

3. (a)  $\int_0^1 (1-x)^m x^n dx$

(b)  $\int_{20}^{30} x^2 dx$

(c)  $2 \int_a^b \sqrt{\sin x} dx$

4.  $\frac{9}{2} \ln \ln 3 - 2 \ln \ln 2 - \frac{1}{2} k$



《복습문제》

1.      (a)  $\frac{1}{2}\ln(x^2 + 1) + C$   
           (b)  $\frac{1}{2}\ln(x^2 + 1) + C$   
           (c)  $\frac{1}{2}\ln(x^2 + 1) + C$   
           (d)  $\frac{1}{2}\ln(x^2 + 1) + C$
  
2.      (a)  $\frac{1}{6}\ln\left|\frac{x-4}{x+2}\right| + C$   
           (b)  $\frac{1}{6}\ln\left|\frac{x-4}{x+2}\right| + C$   
           (c)  $\frac{1}{6}\ln\left|\frac{x-4}{x+2}\right| + C$   
           (d)  $\frac{1}{6}\ln\left|\frac{x-4}{x+2}\right| + C$
  
3.      (a) 공식 64  
           (b)  $\frac{1}{3}\ln|3x+4| + C$   
           (c) 공식 19  
           (d)  $u = 1 + 2x^3$   
           (e)  $u = 3x$   
           (f)  $-\frac{1}{6}e^{-6x} + C$   
           (g)  $\frac{1}{5}\ln|x| + C$   
           (h) 긴 나눗셈  
           (i)  $x + 3\ln|x| + C$   
           (j) 긴 나눗셈  
           (k)  $u = 3x + 4$   
           (l) 완전제곱식  
           (m) 부분적분  
           (n) 공식 1(b)
  
4.      (a)  $\frac{1}{4}\sin 2x - \frac{1}{16}\sin 8x + C$

(b)  $\frac{1}{4}\sin 2x - \frac{1}{16}\sin 8x + C$

(c)  $\frac{1}{4}\sin 2x - \frac{1}{16}\sin 8x + C$

5.  $e^{\pi/3}\sqrt{3} - Q$

6.  $665/12$

7. (a)  $-\cos x + C$

(b)  $\frac{1}{2}(x - \sin x \cos x) + C$

(c)  $-\cos x + \frac{1}{3}\cos^3 x + C$

(d)  $\frac{1}{2}\sin^2 x + C$

(e)  $\frac{1}{3}\sin^3 x + C$

(f)  $-\frac{1}{4}\sin x \cos^3 x + \frac{1}{8}(x + \sin x \cos x) + C$

(g)  $-1/x + C$

(h)  $\ln|x| + C$

(i)  $\frac{1}{2}\sqrt{x} + C$