

MSE, 기초수학

[연습문제 정답 이용 안내]

- 본 연습문제 정답의 저작권은 이재원과 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 01 연습문제 정답

[1.1 연습문제]

1. 16

2. 생략

3. $C < A < B$

4. $6a$

5. $2 + 2\sqrt{2}$

6. $3a - 2b$

7. 5

8. $-4, -2, 0, 2, 4$

9. 0

10. 덧셈에 대한 역원: $\frac{3(1-\sqrt{3})}{2}$

곱셈에 대한 역원: $\frac{1+\sqrt{3}}{3}$

11. $a = \frac{7}{2}, b = -\frac{3}{2}$

[1.2 연습문제]

1. (a) $-\frac{\sqrt{30}}{6}i$ (b) $2+16i$

2. (a) $-\frac{7}{2}+6i$

(b) $5+5i$

(c) $3+2i$

(d) $2-2i$

(e) $\frac{1}{13}-\frac{5}{13}i$

(f) $-\frac{6}{25}-\frac{17}{25}i$

3. (a) $\operatorname{Re}(1/z) = \frac{a}{a^2+b^2}$

(b) $\operatorname{Im}(z^2+i) = 2ab+1$

(c) $\operatorname{Im}(z^2+\overline{z^2}) = 0$

(d) $|z-2+3i| = \sqrt{(a-2)^2+(b+3)^2}$

4. ❸

5. (a) $a=5, b=-2$

(b) $a=-1, b=2$

(c) $a=1, b=3$

(d) $a=b=3$

6. 0

7. 0

8. (a) i (b) 0

9. (a) 0 (b) $-4-4i$

10. $-\frac{3}{5}$

11. 4

[1.3 연습문제]

1. (a) $A(x) + B(x) = 2x^2 - 4x + 4$

$$A(x) - B(x) = -6x + 8$$

(b) $A(x) + B(x) = 2x^3 - 3x^2 - 3x + 4$

$$A(x) - B(x) = -3x^2 - 9x + 12$$

(c) $A(x, y) + B(x, y) = 2x^2 + 5y^2 - 2xy + 2x - 16y + 13$

$$A(x, y) - B(x, y) = -3y^2 + 6xy - 10x + 8y - 5$$

(d) $A(x, y) + B(x, y) = 2x^{2+2y^2} + 4y - 2$

$$A(x, y) - B(x, y) = 4xy + 4x - 4$$

2. (a) $9x^2 - 4$

(b) $27a^3 + 27a^2 + 9a + 1$

(c) $8a^3 + 2a^2 - a - 1$

(d) $a^4 - 5a^2 + 4$

3. (a) 2

(b) 45

(c) 36

(d) 4

4. (a) $(a-1)(a+2)(a-3)$

(b) $(a-b)(ab-bc-ca)$

(c) $(a-b)(a-b+1)$

(d) $(a-b)(b-c)(a-c)$

5. (a) $(a-1)(a+1)(a-2)(a+2)$

(b) $(a+2b+1)(a-b-1)$

(c) $(a+b-1)(a+b+3)$

(d) $3(a-b)(b-c)(c-a)$

6. (a) $(x-1-\sqrt{2})(x-1+\sqrt{2})$

(b) $(x-1-i)(x-1+i)$

(c) $(x-i)(x+i)$

(d) $(x-2)(x+2)(x-2i)(x+2i)$

7. (a) $(x+1)(x-2)(x-3)$

(b) $(x+1)(x-3)(2x-1)$

(c) $(x+2)(x-1)(x^2-x+1)$

(d) $-3(x+1)(x-2)(2x-1)$

8. $a = -6, b = 3$

9. $a = b = 5$

10. (a) $\sqrt{2} + \sqrt{3}$

(b) $2 + \sqrt{2}$

(c) $-10\sqrt{2}$

(d) $10\sqrt{2}$

11. b 가 빗변인 직각삼각형

[1.4 연습문제]

1. (a) $a = 6, b = -15$
(b) $(a, b) = (3, 2), (-1, 2)$
(c) $a = 2, b = -1, c = -2$
(d) $a = 2, b = 1$

2. $a = -2$

3. $a = 2, b = 10$

4. (a) $x = -8, 2$
(b) $-2 \pm 2\sqrt{2}$

5. (a) 28
(b) $\pm 2\sqrt{10}$
(c) $-\frac{68}{3}$
(d) 3664

6. (a) $x = 1, \frac{-1 \pm \sqrt{7}i}{2}$
(b) $x = -1, \frac{3 \pm \sqrt{11}i}{2}$
(c) $x = \pm 1, \pm \sqrt{2}$
(d) $x = -1 \pm \sqrt{2}i$

7. (a) 0
(b) 0
(c) 2
(d) -1

8. (a) -1
(b) 0

9. $a = 1, b = \frac{1}{2}$

10. (a) $m > \frac{2}{3}$
(b) $m = \frac{2}{3}$
(c) $m < \frac{2}{3}$

[1장 연습문제]

1.1 b

1.2 생략

1.3 덧셈에 관하여 닫혀있다.

1.4 $-\frac{61}{6}$

1.5 6

1.6 $a \geq b$ 인 경우, $a - b$
 $a < b$ 인 경우, $b - a$

1.7 0

1.8 $x = 1, y = -3$

1.9 $a = b = 2$

1.10 생략

1.11 (a) $k = 3$ 또는 $k = -1$
(b) $k = 1$

1.12 0

1.13 0

1.14 $\frac{2}{5}$

1.15 0

1.16 $z = -2 - i$

1.17 $3x^2 - 5xy + 7y^2 - 9x + 5y - 9$

1.18 x 의 계수: 0 , x^2 의 계수: -4

1.19 $a^2 - b^2 - c^2 + 2bc$

$$1.20 \quad a^2 + b^2 - c^2 - d^2 - 2ab - 2cd$$

$$1.21 \quad -18$$

$$1.22 \quad 11$$

$$1.23 \quad 4$$

$$1.24 \quad (x-2)(3x-5)$$

$$1.25 \quad 1721$$

$$1.26 \quad 4(a^2 - b^2)^n = 4$$

$$1.27 \quad (x^2 + 3x + 5)^2$$

$$1.28 \quad (x^2 + y^2 - xy)(x^2 + y^2 + xy)$$

$$1.29 \quad 3(a-b)(b-c)(c-a)$$

$$1.30 \quad 3(a+b)(b+c)(c+a)$$

$$1.31 \quad (x+2)(x-1)^2(x-3)$$

$$1.32 \quad (x+3)(x+2)(2x^2 - x + 2)$$

$$1.33 \quad a + b + c + d = 2$$

$$1.34 \quad a \text{가 빗변인 직각삼각형}$$

$$1.35 \quad x^2 - 44x - 2 = 0$$

$$1.36 \quad k = -\frac{1}{2}$$

$$1.37 \quad \text{(a) } a = -2, \quad b = -1$$

$$\text{(b) } a = -2, \quad b = 5$$

$$1.38 \quad m = -3, \quad m = 9$$

$$1.39 \quad a = 4$$

$$1.40 \quad a = 0, \quad b = 1$$

$$1.41 \quad a > \frac{3}{2}$$

$$1.42 \quad x = 1, \quad x = 2(1 + \sqrt{2})$$

$$1.43 \quad x = -i \text{ (중근)}$$

$$1.44 \quad \begin{aligned} x \geq 0 \text{인 경우: } x &= 4 \\ x < 0 \text{인 경우: } x &= -4 \end{aligned}$$

$$1.46 \quad x = -1$$

$$1.45 \quad x \geq \frac{1}{2} \text{인 경우 : } x = 2$$

$$x < \frac{1}{2} \text{인 경우 : } x = 1 - \sqrt{7}$$

$$1.46 \quad x = -1$$

Chapter 02 연습문제 정답

[2.1 연습문제]

- $\overline{OA} = \sqrt{2^2 + 3^2} = \sqrt{13}$
 - $\overline{OB} = \sqrt{(-1)^2 + 1^2} = \sqrt{2}$
 - $\overline{OC} = \sqrt{3^2 + (-2)^2} = \sqrt{13}$
 - $\overline{OD} = \sqrt{(-1)^2 + (-1)^2} = \sqrt{2}$
- x 축 대칭 점: $B(3, 2)$
 y 축 대칭 점 : $C(-3, -2)$
원점 대칭 점: $D(-3, 2)$
- $(-2, -2)$

[2.2 연습문제]

- 함수가 아니다.
 - $\text{ran}(f) = \{1, 2, 4\}$
 - $\text{ran}(f) = \{1, 2, 3, 4, 5\}$
 - $\text{ran}(f) = \{1\}$
- 함수, 치역: $\text{ran}(f) = \{1, 2, 3, 4, 5\}$
 - 함수가 아니다.
 - 함수, 치역: $\text{ran}(f) = \{2, 3, 4\}$
- $2 \leq k \leq 4$

[2.3 연습문제]

1. $a = b = -1$

2. $a = 1$

3. (a) $2f(x) + g(x) = 2\sqrt{x} + x^2$, $\text{dom}(2f + g) = \{x \in R : x \geq 0\}$

(b) $f(2x) - g(x) = \sqrt{2x} - x^2$, $\text{dom}(f - g) = \{x \in R : x \geq 0\}$

(c) $f(x) \cdot g(x) = x^2 \sqrt{x}$, $\text{dom}(f \cdot g) = \{x \in R : x \geq 0\}$

(d) $k(x) = \frac{f(x) - 2g(x)}{f(x)g(x)} = \frac{\sqrt{x} - 2x^2}{x^2 \sqrt{x}}$, $\text{dom}(k) = \{x \in R : x > 0\}$

(e) $(f \circ g)(x) = \sqrt{x^2} = |x|$, $\text{dom}(f \circ g) = R = (-\infty, \infty)$

(f) $(g \circ f)(x) = (\sqrt{x})^2 = x$, $\text{dom}(g \circ f) = \{x \in R : x \geq 0\}$

4. $a = -2$, $b = -4$

5. $a = 4$, -3

6. -1

7. $h(x) = \frac{1}{2}x + \frac{1}{2}$

8. $a = -1$

[2.4 연습문제]

1. (a) $y = -x + 5$
(b) $y = -2x - 2$

2. (a) $y = -x^2 + 2x + 2$
(b) $y = 2x^2 - x + 1$
(c) $y = 5x^2 - 3x - 2$

3. (a) 최댓값 : 8, 최솟값 : -1.
(b) 최댓값 : 8, 최솟값 : -7.
(c) 최댓값 : 19, 최솟값 : 3

4. (a) $(1, 0)$, $(2, 0)$
(b) $(1/2, 0)$
(c) 없다.

5. $k \leq 1$

6. $k > 3 + 2\sqrt{5}$

7. $-2 < k < 2$

8. (a) $R - \{0\}$
(b) $R - \{1, 4\}$
(c) $-2 \leq x \leq 2$
(d) $x \leq -1$, $x \geq 4$

[2장 연습문제]

2.1 $-2 \leq k \leq -1$

2.2 $a = 1, X = \{1\}$

2.3 7

2.4 (a) $x^2 + 1$

(b) x^2

(c) 생략

2.5 $(\overbrace{f \circ \cdots \circ f}^n)(x) = x + n$ (n 은 자연수)

2.6 1

2.7 (a) 7 (b) 3 (c) $\frac{11}{3}$ (d) $\frac{11}{3}$

2.8 $a = \frac{1}{2} + \frac{1}{4}\sqrt{2}, b = \frac{1}{2} - \frac{1}{4}\sqrt{2}$

2.9 $a \geq 4$

2.10 -16

2.11 $y = 4x \circledast$

2.12 $f(-1) > f(0) > f(0) > f(2)$

2.13 $p = -6, q = 10, f(2) = 2$

2.14 $-1 < a < 0$

2.15 $a > 5$

2.16 1

2.17 (a) 전사함수

(b) 전단사함수

(c) 단사함수

Chapter 03 연습문제 정답

[3.1 연습문제]

1. (a) $2\sqrt[4]{2}$ (b) $2\sqrt[5]{2^3}$ (c) 96 (d) $2^{\frac{29}{64}}$

2. (a) 2 (b) 3 (c) 4 (d) $2\log_3 5$

3. $k = \frac{1}{5}$

4. (a) $\sqrt{6}$ (b) $\frac{25}{6}$ (c) -1 (d) $\frac{4}{3}$

5. (a) $x = 2$ (b) $x = \frac{16}{5}$ (c) $x = \log_2 3$ (d) $x = 2\log_{10} 2$

6. (a) $x = 3 + \ln 4$

(b) $x = \ln(\ln 10)$

(c) $x = \ln 3$

(d) $x = -\ln 4 = \ln \frac{1}{4}$

7. (a) $x = \frac{1}{4}(3 - e^{-2})$

(b) $x = e^e$

(c) $x = \frac{-1 + \sqrt{1 + 12e^2}}{6}$

(d) $x = 3, x = -2$

8. (a) $x = 4^{\frac{1}{2}} = 2$

(b) $x = \frac{13}{18}$

(c) $x = \frac{3^9}{4}$

(d) $x = 1$

9. $\frac{1}{5\sqrt[5]{2^3}}$

10. $x = 2$

[3.2 연습문제]

1. $y = 2 + 5^{-x+1}$
2. $a = -\frac{1}{2} \log_2 5$
3. $p = -1, q = 1$
4. 14
5. (a) $\alpha = 2, \beta = 3$ (b) $\alpha = 2, \beta = 4$
6. 16

[3.3 연습문제]

1. $a > 1$
2. $a = 8$
3. $(g \circ f)(-3) = (-2) \cdot (-3) = 6, (f \circ g)(4) = \frac{1}{4^2} = \frac{1}{16}$
4. 9
5. 1
6. 역함수: $y = g^{-1}(x) = 1 + 2^{x-1}$, 치역: $y > 1$
7. 2
8. 2
9. -1
10. (a) $f^{-1}(x) = 1 + \ln(x-2), x > 2$
(b) $f^{-1}(x) = -\ln(x+1), x > -1$
(c) $f^{-1}(x) = \ln\left(\frac{x + \sqrt{x^2 - 4}}{2}\right), x \geq 2$
(d) $f^{-1}(x) = \log_2(x + \sqrt{x^2 - 1}), x \geq 1$
11. (a) 3 (b) $\log_2 \frac{7}{5}$

[3.4 연습문제]

1. (a) $\cosh x = \frac{\sqrt{13}}{3}$, $\tanh x = \frac{2\sqrt{13}}{13}$, $\operatorname{cosech} x = \frac{3}{2}$, $\operatorname{sech} x = \frac{3\sqrt{13}}{13}$, $\coth x = \frac{\sqrt{13}}{2}$

(b) $\sinh x = \sqrt{3}$, $\tanh x = \frac{\sqrt{3}}{2}$, $\operatorname{cosech} x = \frac{\sqrt{3}}{3}$, $\operatorname{sech} x = \frac{1}{2}$, $\coth x = \frac{2\sqrt{3}}{3}$

2. (a) $\frac{\sqrt{13} + 2\sqrt{5}}{6}$

(b) $\frac{2 + \sqrt{65}}{6}$

3. $\tanh x = \pm \sqrt{2}$

4. (a) $\frac{1}{2} [\sinh(4x) + \sinh(2x)]$

(b) $\frac{1}{2} [\cosh(3x) + \cosh(x)]$

5. (a) $2\cosh \frac{3x}{2} \cosh \frac{x}{2}$

(b) $2\cosh(3x) \sinh x$

6. 생략

[3장 연습문제]

3.1 $\frac{9}{2} - \frac{3}{2} \log_3 7$

3.2 1

3.3 1

3.4 3

3.5 14

3.6 11

3.7 $k = \frac{2015}{2016}$

3.8 4^x

3.9 $\frac{1}{2}$

3.10 $x = \log_3 4 = 2 \log_3 2$

3.11 $x = -1, x = -2$

3.12 $x = 0, x = 1$

3.13 8

3.14 $x = 3^{2-2\sqrt{2}}$

3.15 $x = 0, x = 1$

3.16 $m = 1$

3.17 $a = -3, b = -3$

3.18 10

3.19 $x = 17$

3.20 0

3.21 2

Chapter 04 연습문제 정답

[4.1 연습문제]

1. (a) $10^\circ = \frac{10}{180} = \frac{1}{18}$

(b) $110^\circ = \frac{110}{180} = \frac{11}{18}$

(c) $250^\circ = \frac{250}{180} = \frac{25}{18}$

(d) $320^\circ = \frac{320}{180} = \frac{16}{9}$

2. $\frac{4\pi}{3}$

3. 제2사분면의 각

4. $\sin \theta = -\frac{3}{5}$, $\tan \theta = -\frac{3}{4}$, $\sec \theta = \frac{5}{4}$, $\operatorname{cosec} \theta = -\frac{5}{3}$, $\cot \theta = -\frac{4}{3}$

5. $\theta = \frac{2\pi}{3}$

6. 48π

7. (a) $\frac{1}{2}$

(b) 0

(c) 1

(d) 2

8. $\tan \theta = \frac{\sin \theta}{\cos \theta} = -\frac{4}{3}$, $\sec \theta = -\frac{5}{3}$, $\operatorname{cosec} \theta = \frac{5}{4}$, $\cot \theta = -\frac{3}{4}$

9. $-\sin \theta - \cos \theta$

[4.2 연습문제]

1. $\sqrt{3}$

2. $\frac{7}{10}$

3. (a) $2\operatorname{cosec}^2\theta$ (b) 2 (c) $\cos\theta + \sin\theta$ (d) $2\sec\theta$

4. (a) $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{2}}{2}$ (c) $\sqrt{3}$

5. (a) $2\sec\theta$ (b) 0

6. (a) $-\frac{\sqrt{3}}{2}$ (b) $\frac{\sqrt{3}}{2}$

7. (a) $\sin(\alpha + \beta) = \frac{\sqrt{3}}{2}$, $\cos(\alpha + \beta) = -\frac{1}{2}$, $\tan(\alpha + \beta) = -\sqrt{3}$

(b) $\alpha + \beta = \frac{2\pi}{3}$

8. (a) $\sin 2\alpha = \frac{4\sqrt{5}}{9}$, $\cos 2\alpha = \frac{1}{9}$

(b) $\sin \frac{\alpha}{2} = -\sqrt{\frac{3-2\sqrt{2}}{6}}$

$$\cos \frac{\alpha}{2} = \sqrt{\frac{3+2\sqrt{2}}{6}}$$

9. (a) $\frac{1}{4}(2 + \sqrt{3})$ (b) $\frac{\sqrt{6}}{2}$

10. $-\frac{3+4\sqrt{3}}{13}$

11. (a) 0.3419 (b) 0.9396 (c) 0.6425 (d) 0.9662 (e) -0.1736 (f) -0.0875

12. (a) $2\sin\left(\theta - \frac{\pi}{4}\right)$

(b) $-2\sin\left(\theta + \frac{\pi}{6}\right)$

(c) $5\sin(\theta + \alpha)$

[4.3 연습문제]

1. (a) $f\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}-1}{2}$

$$f\left(\frac{3\pi}{4}\right) = \sqrt{2}$$

$$f\left(-\frac{2\pi}{3}\right) = \frac{1-\sqrt{3}}{2}$$

$$f\left(-\frac{\pi}{4}\right) = -\sqrt{2}$$

(b) $g\left(\frac{\pi}{3}\right) = 2 + \sqrt{3}$

$$g\left(\frac{3\pi}{4}\right) = -1 - \sqrt{2}$$

$$g\left(-\frac{2\pi}{3}\right) = -2 + \sqrt{3}$$

$$g\left(-\frac{\pi}{4}\right) = -1 + \sqrt{2}$$

2. (a) 주기 : $p = \frac{2\pi}{4} = \frac{\pi}{2}$, 진폭 : $a = \sqrt{3}$, 최댓값 : $\sqrt{3}$, 최솟값 : $-\sqrt{3}$

(b) 주기 : $p = \frac{2\pi}{\pi/4} = 8$, 진폭 : $a = 2$, 최댓값 : 2 , 최솟값 : -2

(c) 주기 : $p = \frac{2\pi}{1/12\pi} = 24\pi^2$, 진폭 : $a = 3\sqrt{5}$, 최댓값 : $3\sqrt{5}$, 최솟값 : $-3\sqrt{5}$

(d) 주기 : $p = \frac{2\pi}{1/12\pi} = 24\pi^2$, 진폭 : $a = 3\sqrt{5}$, 최댓값 : $3\sqrt{5}$, 최솟값 : $-3\sqrt{5}$

3. (a) 최댓값 : $\sqrt{3}$, 최솟값 : $-\sqrt{3}$

(b) 최댓값 : $\frac{2\sqrt{3}}{3}$, 최솟값 : $-\frac{2\sqrt{3}}{3}$

4. (a) $y = \frac{\sqrt{3}}{3}x + 1$ (b) $y = \sqrt{3}x + \sqrt{3} - 1$

5. $\theta = \frac{\pi}{6}$

6. (a) 최솟값 : $f\left(\frac{1}{2}\right) = \frac{1}{2}$, 최댓값 : $f(-1) = 5$

(b) 최댓값 : $f\left(\frac{1}{4}\right) = \frac{1}{8}$, 최솟값 : $f(-1) = -3$

7. $a = 3, b = \frac{3}{2}, c = 1$

8. $a = \frac{3}{2}, b = 1$

[4.4 연습문제]

1. (a) $-\frac{\pi}{4}$ (b) $\frac{\pi}{4}$ (c) $-\frac{\pi}{3}$ (d) 존재하지 않는다.

2. $x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right) = \frac{\pi}{6}$

3. $x = \pi$

4. (a) $\sec(\tan^{-1}x) = \sec\alpha = \sqrt{1+x^2}$
 (b) $\tan(\cos^{-1}x) = \tan\alpha = \frac{\sqrt{x^2-1}}{x}$

[4장 연습문제]

4.1 $r=3, \theta=2(\text{rad})$

4.2 $r=8, l=r\theta=8\left(\frac{\pi}{4}\right)=2\pi$

4.3 $\sin\theta=-\frac{2\sqrt{6}}{7}, \cos\theta=-\frac{5}{7}, \tan\theta=\frac{2\sqrt{6}}{5}$

4.4 $\sin\theta=-\frac{\sqrt{3}}{2}, \cos\theta=-\frac{1}{2}, \tan\theta=\sqrt{3}$

4.5 $h=50(1+\sqrt{3})$

4.6 (a) $\theta=\frac{16}{5}\pi, \theta=\frac{18}{5}\pi$

(b) $\theta=\frac{3\pi}{4}$

4.7 $\sec\theta+\tan\theta=-\frac{3}{\sqrt{5}}-\frac{2}{\sqrt{5}}=-\frac{5}{\sqrt{5}}=-\sqrt{5}$

4.8 $\cos\theta=\frac{\sqrt{5}}{3}$

4.9 4

4.10 (a) $\cos\theta=\frac{15}{17}, \tan\theta=\frac{8}{15}, \sec\theta=\frac{17}{15}, \operatorname{cosec}\theta=\frac{17}{8}, \cot\theta=\frac{15}{8}$

(b) $\sin\theta=-\frac{7}{25}, \tan\theta=-\frac{7}{24}, \sec\theta=\frac{25}{24}, \operatorname{cosec}\theta=-\frac{25}{7}, \cot\theta=-\frac{24}{7}$

4.11 (a) $-\sin\theta+\cos\theta$ (b) $-2\cos\theta$

4.12 (a) $\sin\theta\cos\theta=-\frac{1}{8}$

(b) $\sin^3\theta+\cos^3\theta=\frac{9\sqrt{3}}{16}$

(c) $\tan\theta+\cot\theta=-8$

(d) $\tan^2\theta+\cot^2\theta=62$

4.13 1

$$4.14 \quad 1$$

$$4.15 \quad -\frac{1}{2}$$

$$4.16 \quad \frac{\sqrt{2}}{2}$$

$$4.17 \quad \frac{\sqrt{3}}{2}$$

$$4.18 \quad \frac{\sqrt{3}}{3}$$

$$4.19 \quad 0$$

$$4.20 \quad 1$$

$$4.21 \quad 0$$

$$4.22 \quad \sin(\alpha + \beta) = \frac{3\sqrt{3} - \sqrt{7}}{8}$$

$$\cos(\alpha + \beta) = -\frac{3 + \sqrt{21}}{8}$$

$$\tan(\alpha + \beta) = \frac{4\sqrt{3} - 3\sqrt{7}}{3}$$

$$4.23 \quad \cos 37.5^\circ = \sqrt{\frac{4 + \sqrt{6} - \sqrt{2}}{8}}$$

$$\sin 37.5^\circ = \sqrt{\frac{4 - \sqrt{6} + \sqrt{2}}{8}}$$

$$\tan 37.5^\circ = \sqrt{\frac{4 - \sqrt{6} + \sqrt{2}}{4 + \sqrt{6} - \sqrt{2}}}$$

$$4.24 \quad \sin 3\alpha = 3\sin \alpha - 4\sin^3 \alpha$$

$$\cos 3\alpha = 4\cos^3 \alpha - 3\cos \alpha$$

$$4.25 \quad (a) \quad \sin 2\alpha = -\frac{9}{25} \quad (b) \quad \sin 3\alpha - \cos 3\alpha = -\frac{172}{125}$$

$$4.26 \quad \text{생략}$$

4.27 생략

4.28 $\frac{1}{2}$

4.29 최댓값 : $\sqrt{13}$, 최솟값 : $-\sqrt{13}$

4.30 최댓값 : $\sqrt{34+15\sqrt{2}}$, 최솟값 : $-\sqrt{34+15\sqrt{2}}$

4.31 (a) $y=-\sqrt{3}x-\frac{1}{2}$ (b) $y=-x+2$

4.32 $\theta=\frac{\pi}{3}$

4.33 $-\frac{3}{10}$

4.34 $\frac{1}{2}$

4.35 $-\frac{\pi}{6}$

4.36 $\frac{5\pi}{6}$

4.37 0

4.38 $-\frac{77}{36}$

4.39 $\frac{\sqrt{3}}{2}$

4.40 $\frac{\pi}{2}$

4.41 $\frac{3\pi}{4}$

4.42 생략

4.4 3생략

Chapter 05 연습문제 정답

[5.1 연습문제]

1. (a) -3
(b) -2
(c) $x \rightarrow -3$ 일 때, 좌극한과 우극한이 서로 다르므로 $\lim_{x \rightarrow -3} f(x)$ 는 존재하지 않는다.
(d) 3
(e) 1
(f) $x \rightarrow 0$ 일 때, 좌극한과 우극한이 서로 다르므로 $\lim_{x \rightarrow 0} f(x)$ 는 존재하지 않는다.
2. (a) 4
(b) 0
(c) 6
(d) 존재하지 않는다.
3. (a) 존재하지 않는다.
(b) 1
(c) $\frac{1}{3}$
(d) 0
4. (a) $\lim_{x \rightarrow 1} f(x) = 0$
(b) 존재하지 않는다.
5. (a) 1
(b) 1
(c) $-\infty$
(d) ∞

[5.2 연습문제]

1. (a) 1 (b) 8 (c) -2 (d) $-\frac{1}{2}$

2. (a) 0 (b) 2

3. (a) 2

(b) 존재하지 않는다.

(c) -1

(d) 0

4. (a) $\frac{1}{2}$ (b) $2\sqrt{2}$ (c) 0 (d) $\frac{1}{2}$

5. (a) 0 (b) 0

6. $a = 1$

7. 생략

[5.3 연습문제]

1. (a) $\frac{1}{2}$ (b) 0 (c) 1 (d) $\frac{1}{2}$

2. (a) $\frac{1}{2}$ (b) $\sqrt{2}$

3. 0

4. (a) $\frac{\pi}{180}$ (b) 540

[5.4 연습문제]

1. 0
2. (a) 0 (b) 1
3. (a) 1 (b) $-\infty$ (c) $\ln 2$ (d) 0
4. (a) $\frac{1}{\sqrt{e}}$ (b) e^{-1} (c) 1 (d) $\frac{1}{3}$
5. (a) 3 (b) 1 (c) $-\frac{3}{2}$ (d) $-\frac{2}{3}$
6. (a) 3 (b) 1

[5.5 연습문제]

1. (a) $x = 1$ 에서 불연속
(b) $x = 1$ 에서 불연속
(c) $x = 2$ 에서 불연속
(d) $x = 0$ 에서 불연속
2. $x \leq -3$, $x \geq 3$ 에서 연속
3. (a) 모든 실수에서 연속
(b) $x \neq 2$ 인 모든 실수에서 연속
(c) $x \neq \pm 2\sqrt{2}$ 인 모든 실수에서 연속
4. 4
5. $\sqrt{3}$
6. -3
7. 생략

[5장 연습문제]

5.1 -1

5.2 $\frac{1}{2}$

5.3 1

5.4 $-\frac{1}{2}$

5.5 4

5.6 0

5.7 0

5.8 0

5.9 $\frac{2}{3}$

5.10 0

5.11 3

5.12 0

5.13 0

5.14 π

5.15 $-\pi$

5.16 $\frac{1}{2}$

5.17 0

5.18 1

5.19 1

5.20 -1

5.21 0

5.22 ∞

5.23 $a = -2, b = \pi$

5.24 $a = \frac{1}{2}$

5.25 (a) -1

(b) 1

(c) 좌극한과 우극한이 같지 않으므로 $\lim_{x \rightarrow 0} \operatorname{sgn}(x)$ 는 존재하지 않는다.

(d) $x \neq 0$ 이면, $|\operatorname{sgn}(x)| = 1$ 이므로 $\lim_{x \rightarrow 0} |\operatorname{sgn}(x)| = 1$ 이다.

5.26 1

5.27 (a) 생략

(b) $\lim_{x \rightarrow n-} f(x) = 1, \lim_{x \rightarrow n+} f(x) = 0$

(c) 정수가 아닌 모든 실수에서 연속

5.28 $x = 3$ 에서 불연속

5.29 $x = 2$ 에서 불연속

5.30 $x = 3$ 에서 불연속

5.31 $x = 2$ 에서 연속

5.32 $a = 1, a = 2$

5.33 $b = 1, c = -2$

5.34 생략

5.35 생략

5.36 $a = 1, f(1) = 2$

Chapter 06 연습문제 정답

[6.1 연습문제]

1. $x = 0$ 에서 연속, $x = 0$ 에서 미분가능하지 않다.

2. $a = \frac{3}{2}$

3. $y = 3x + 1, y = -\frac{1}{3}(x - 7)$

4. $-\frac{1}{x^2}$

5. $a = -5$

6. (a) 9 (b) -2 (c) $-\frac{15}{2}$ (d) $-\frac{8}{5}$

7. (a) -1 (b) 0

8. 1

[6.2 연습문제]

1. (a) $4x(x-1)(x+1)$

(b) $18x^2 + 18x - 2$

(c) $\frac{x^2 - 2x - 2}{(x-1)^2}$

(d) $\frac{2(x^2 - 3x + 1)}{(x^2 - 1)^2}$

2. (a) $8(2x-3)^3$

(b) $\frac{2}{\sqrt[3]{3x-1}}$

(c) $-\frac{3(x+2)}{2\sqrt[4]{(x^2+4x-1)^7}}$

(d) $\frac{5(x^2-1)(x^2+1)^4}{x^6}$

3. (a) $x = \sqrt[3]{y-1}$

(b) $\frac{1}{3 \sqrt[3]{(y-1)^2}}$

(c) (b)에서 구한 도함수와 일치한다.

4. (a) $\frac{1}{2 \sqrt{y-1}}$

(b) $\frac{1}{2(x+1)}$

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

5. (a) $\frac{1}{5x^4 - 6x^2 + 1}$

(b) $\frac{(x^2 + 1)^2}{1 - x^2}$

6. (a) $\frac{4x - y^2}{2xy}$ (b) $-\frac{y^2 + 2xy}{x^2 + 2xy}$ (c) $\frac{y - 2x}{2y - x}$ (d) $\frac{2y - x}{y - 2x}$

7. $y = \frac{2\sqrt{3}}{3}x - \frac{\sqrt{3}}{3}$

8. (a) $t + 1$

(b) $\frac{t^2 - 1}{t^2 + 1}$

(c) $\frac{(1 + t^2)^3}{2t^3}$

(d) $\frac{2(1 + 2t^2)\sqrt{t-1}}{\sqrt{1+t^2}}$

9. (a) $f(x) = \frac{1}{2} \frac{1}{x-1} - \frac{1}{2} \frac{1}{x+1}$

(b) $f^{(n)}(x) = \frac{1}{2}(-1)^n(n!)(x-1)^{-(n+1)} - \frac{1}{2}(-1)^n(n!)(x+1)^{-(n+1)}$

(c) $-\frac{14560}{243}$

10. 생략

[6.3 연습문제]

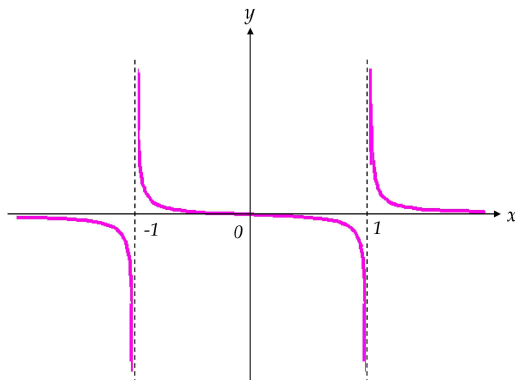
1. (a) $\ln 2$
(b) $-4\ln 2$
(c) $1 + \ln 3$
(d) 2
2. (a) $\cos x - 3\sin x$
(b) $-2x \sin(2x^2)$
(c) $\sec x (\tan^2 x + \sec^2 x)$
(d) $\sin(x^2 - 1) + 2x^2 \cos(x^2 - 1)$
3. (a) $(\ln 2)2^x + 2e^{2x}$
(b) $(x^2 + 3x + 2)e^x$
(c) $\cos x ((\ln 3)3^{\sin x} + 3\sin^2 x)$
(d) $(\cos x - 2x \sin x \sin(x^2))e^{\cos x^2}$
4. (a) $1 + \frac{1}{x}$
(b) $\frac{1}{\ln x} + \ln(\ln x)$
(c) $\frac{1}{x(\ln 2)\ln x}$
(d) $\frac{\cos x - \sin x}{\cos x + \sin x}$
5. (a) $2\cosh(2x + 1)$
(b) $\frac{\sin x + \cos x}{\sqrt{\sin 2x}}$
(c) $-\frac{x+1}{x\sqrt{1-(x+\ln x)^2}}$
(d) $\frac{e^{x+2}}{\sqrt{1-e^{2(x+2)}}}$
6. $y = -\frac{4+\pi}{20}x + \frac{16+9\pi}{20}$

[6.4 연습문제]

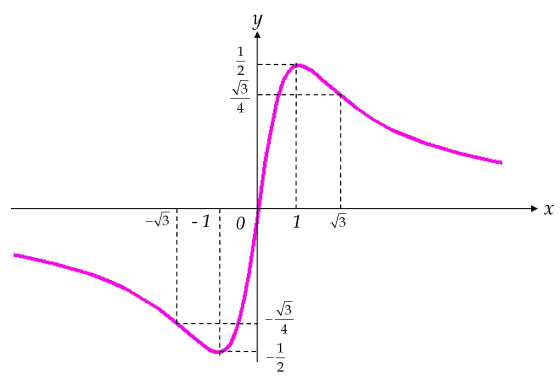
1. (a) $c = 0$ (b) $c = \frac{3}{2}$
2. (a) $c = \frac{3+2\sqrt{3}}{3}$ (b) $c = \frac{10-3\ln 11}{2\ln 11}$
3. (a) 0.5736 (b) 0.495 (c) 0.04 (d) 1.2
4. (a) 1 (b) 1 (c) 1 (d) 0
5. (a) 1 (b) 1
6. 생략

[6.5 연습문제]

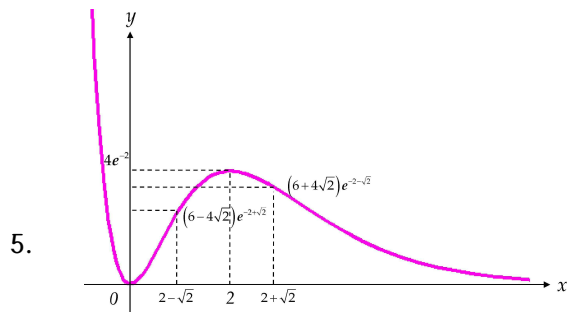
1. (a) 감소하는 구간은 $x < 2$ 이고, 증가하는 구간은 $x > 2$ 이다.
(b) 감소하는 구간은 $-\frac{2}{3} < x < 2$ 이고, 증가하는 구간은 $x < -\frac{2}{3}$, $x > 2$ 이다.
(c) 감소하는 구간은 $0 < x < 1$ 이고, 증가하는 구간은 $x > 1$ 이다.
(d) 감소하는 구간은 $x < 0$, $0 < x < 2$ 이고, 증가하는 구간은 $x > 2$ 이다.
2. (a) $k < -\frac{\sqrt{2}}{2}$ (b) $-\sqrt{3} < k < \sqrt{3}$
3. (a) 극솟값 : -6 , 극댓값 : 26 , 최댓값 : 26 , 최솟값 : -55
(b) 극댓값 : -2 , 극솟값 : 2
(c) 극솟값 : 1 , 최솟값 : 1
(d) 극솟값 : $2\sqrt{2}$, 최댓값 : $2\sqrt{2}$, 최솟값 : 2
(e) 극댓값 : e^{-2} , 극솟값 : 0 , 최댓값 : e^2 , 최솟값 : 0
(f) 극댓값 : $-\pi$, 극솟값 : π , 최댓값 : 2π , 최솟값 : -2π 이다.
4. (a) 변곡점은 $x = 3$ 이다. $x < 3$ 이면 아래로 볼록이고 $x > 3$ 이면 위로 볼록이다.
(b) 변곡점은 $x = 0$ 이다. $x < 0$ 이면 위로 볼록이고 $x > 0$ 이면 아래로 볼록이다.
(c) 변곡점은 $x = 0$ 이다. $x < 0$ 이면 아래로 볼록이고 $x > 0$ 이면 위로 볼록이다.
(d) 변곡점은 $x = \frac{-2 \pm \sqrt{2}}{2}$ 이다. $-2 < x < \frac{-2 - \sqrt{2}}{2}$ 이면 위로 볼록이고
 $\frac{-2 - \sqrt{2}}{2} < x < \frac{-2 + \sqrt{2}}{2}$ 면 아래로 볼록, $\frac{-2 + \sqrt{2}}{2} < x < 1$ 이면 위로 볼록이다.



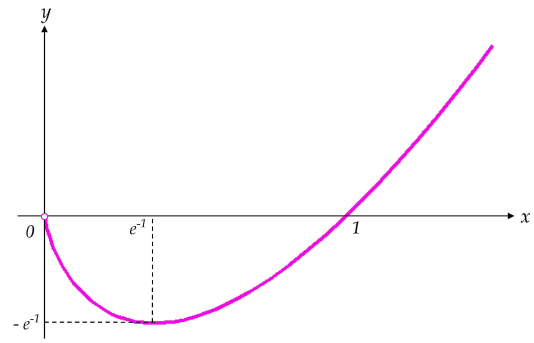
(a)



(b)



(c)



(d)

6. 256cm^3

7. $\Delta x = -75(\text{m})$, $\bar{v} = -1.5(\text{m/s})$, 평균 속력 $= \frac{155}{50} = 3.1(\text{m/s})$

[6장 연습문제]

6.1 $8x + 12$

6.2 $\frac{1}{(2x+1)^2}$

6.3 $f'(0) = 0$

6.4 $x = 0$ 에서 미분계수가 존재하지 않는다.

6.5 (a) 1 (b) $\frac{5}{2}$

6.6 $-\frac{x^2 + 4x + 1}{(x^2 - 1)^2}$

6.7 $\frac{2\sqrt{x} + 1}{4\sqrt{x^2 + x}\sqrt{x}}$

6.8 $x > 0$ 이면 $\sin x - x \cos x$
 $x < 0$ 이면 $-\sin x + x \cos x$

6.9 $(1 + 2 \cos 2x) \sec^2(x + \sin 2x)$

6.10 $2 \sec^3 x - \sec x$

6.11 $-\frac{x+1}{x} \sin(x + \ln 2x)$

6.12 $-(x^2 - 3x + 2)e^{-x}$

6.13 $-2x + 1 + \ln 2x$

6.14 $y - y_0 = -\frac{b^2 x_0}{a^2 y_0} (x - x_0)$

6.15 $y - y_0 = \frac{b^2 x_0}{a^2 y_0} (x - x_0)$

6.16 $\frac{4}{5}$

$$6.17 \quad -\frac{49}{37}$$

$$6.18 \quad 1$$

$$6.19 \quad 0$$

$$6.20 \quad 1$$

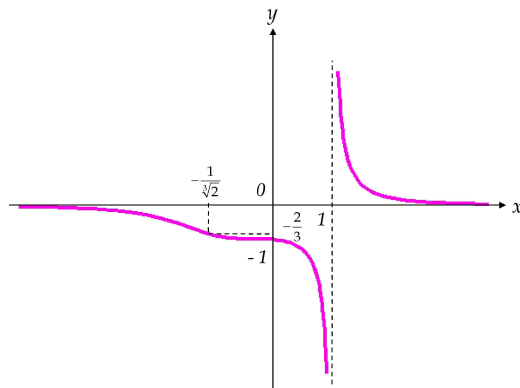
$$6.21 \quad 0$$

$$6.22 \quad (a) \quad y' = e^{ax} (a \sin bx + b \cos bx)$$

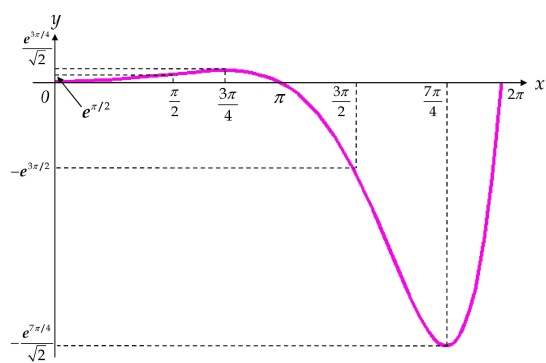
$$y'' = e^{ax} [(a^2 - b^2) \sin bx + 2ab \cos bx]$$

(b) $a = 1, b = 1$

$$6.23$$



$$6.24$$



$$6.25 \quad \text{생략}$$

$$6.26 \quad x = 10, h = 5$$

$$6.27 \quad \theta = \pi/6$$

6.28 (a) $\Delta x = 2$, $\bar{v} = 1(\text{m/s})$

(b) $t = 1\text{ s}$

(c) $v(2) = 3(\text{m/s})$, $|v(2)| = |3| = 3(\text{m/s})$

6.29 (a) $\bar{a} = 3(\text{m/s}^2)$

(b) $a(2) = 6(\text{m/s}^2)$

6.30 말뚝의 위치는 $x = 10$ 이고, 두 철선의 길이는 $5\sqrt{5}$, $10\sqrt{5}$ 이다.

6.31 (a) $\Delta x = -2.25$, $\bar{v} = \frac{\Delta x}{\Delta t} = -1.5$

(b) 2초

(c) $t = 1\text{ s}$

(d) $v(1.5) = -3(\text{m/s})$, $|v(1.5)| = |-3| = 3(\text{m/s})$

6.32 $t = 50$, $3750(\text{m})$

6.33 20초, $1000(\text{m})$

Chapter 07 연습문제 정답

[7.1 연습문제]

1. (a) $x - x^2 + \sin x$
(b) $\tan x + \ln(2x + 1)$
2. (a) $\frac{1}{2}x^2 + 2x + C$
(b) $\frac{2}{3}x^3 + \frac{3}{2}x^2 - x + C$
(c) $x^2 - x + \ln|x| + C$
(d) $x - \frac{4}{x\sqrt{x}} + \ln|x| + C$
(e) $x - \cos x - 2\sin x + C$
(f) $\sin^{-1}x - 2\tan^{-1}x + C$
(g) $\frac{2^x}{\ln 2} + 3e^x + C$
(h) $\cosh x + 2\sinh x + C$
3. (a) $f(x) = \frac{2}{5}x^2\sqrt{x} + \frac{1}{2}$
(b) $f(x) = x^2 + 1 - 3\ln|x|$
4. (a) $f(x) = 2\ln|x| + 1$
(b) $f(x) = -\frac{3}{2}(x^2 - 1) + 2\ln|x|$
5. (a) $f(x) = \sin x - \cos x + 2$
(b) $f(x) = \frac{1}{2}x^2 - x + e^x + \frac{3}{2} - e$
6. (a) -2
(b) $\frac{4}{3}$
(c) 8
7. (a) $a = -\frac{3}{2}, f(x) = \frac{1}{3}x^3 - \frac{3}{4}x^2 - x - \frac{17}{12}$
(b) $a = -2, f(x) = \frac{1}{3}x^3 - x^2 - x + \frac{2}{3}$

[7.2 연습문제]

1. (a) $\frac{1}{12}(2x^2+1)^3 + C$

(b) $\frac{1}{4}(x^3+3)^4 + C$

(c) $\frac{1}{3}(x^2-2)^{3/2} + C$

(d) $\frac{2}{3}(1+2x^2)^{3/2} + C$

(e) $\frac{1}{2}(\ln|x|)^2 + C$

(f) $-\ln|\operatorname{cosec} x + \cot x| + C$

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

(h) $\frac{1}{9}x^3(-1+3\ln x) + C$

(i) $x \sin x - \cos x + C$

(j) $x \cos^{-1} x - \sqrt{1-x^2} + C$

(k) $x + \sin^2 x + C$

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

(m) $\frac{e^{ax}}{a^2+b^2}(a \cos bx + b \sin bx) + C, \quad C = -\frac{ab}{a^2+b^2} C'$

(n) $\frac{e^{ax}}{a^2+b^2}(a \sin bx - b \cos bx) + C, \quad C = -\frac{ab}{a^2+b^2} C'$

[7.3 연습문제]

1. (a) $\frac{2}{3}$ (b) $2\ln 2$ (c) $\frac{2}{3}$ (d) 1 (e) $\frac{\ln 2}{1 + \ln 2}$ (f) $-1 + 2\ln 2$ (g) 1

(h) $-\frac{1}{8}[4\sqrt{2} + \pi(-4 + \sqrt{2})]$ (i) $\frac{\pi - 2}{4}$ (j) $e + e^{-1} - 2$

2. $\frac{b^2}{2}$

3. (a) $\sqrt{3}$ (b) $\frac{2\sqrt{3}}{3}$

4. 2

5. (a) 6 (b) $\frac{6}{5}$

6. (a) $\frac{3}{2}$ (b) $-\frac{1}{3}$

7. (a) $F'(x) = x^3$ (b) $\frac{255}{4}$

8. $a = 2$

9. (a) $x^2 + 1$

(b) $\frac{2x^3}{1 + x^4}$

(c) $2x^7 - \frac{14}{3}x^6 + 7x^5 - 10x^4 + \frac{7}{3}x^3 + 14x^2$

(d) $\frac{\sqrt{1 + \sqrt{x}}}{2\sqrt{x}} - \sqrt{x + 1}$

10. (a) $\frac{1}{3}$ (b) $\frac{1}{3}$

[7.4 연습문제]

1. (a) $\frac{1}{2} \tan^{-1} \frac{x}{2} + C$
- (b) $\ln \left| \frac{x+1}{x+2} \right| + C$
- (c) $\ln|x-1| - \frac{4x-3}{2(x-1)^2} + C$
- (d) $\frac{1}{3}x^3 + \frac{1}{2}x^2 + x + C$
- (e) $\frac{1}{2}(x^2 + \ln |(x-1)(x+1)^3|) + C$
- (f) $\frac{x^2}{2} + \tan^{-1} x + C$
- (g) $\frac{1}{2} \ln \frac{x^2}{x^2+1} + C$
- (h) $\frac{1}{x+1} + \ln \left| \frac{x}{x+1} \right| + C$
- (i) $\frac{1-2x}{2(x-1)^2} + \ln|x-1| + C$
- (j) $\frac{2}{x} + \frac{3}{2} \ln \left| \frac{x-2}{x} \right| + C$
- (k) $\frac{1-2x}{2(x-2)^2} + C$
- (l) $\frac{1}{2} \ln \left| \frac{x^2(x-1)}{x+1} \right| + C$

2. (a) $\frac{1}{3}(3\ln 2 - \ln 5)$
- (b) $\frac{1}{2} \ln \frac{3}{2}$
- (c) $\frac{1}{2}(15\ln 2 - 9\ln 3)$
- (d) $\frac{1}{3} \tan^{-1} \frac{2}{3}$
- (e) 0
- (f) $\frac{1}{8}(-\pi + 6\ln 2)$

3. $f(x) = 1 + \ln \left| \frac{x-2}{2(x-1)} \right|$

[7.5 연습문제]

1. (a) $-\frac{1}{5}\cos^5 x + \frac{2}{3}\cos x + \cos x + C$

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

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

(d) $\frac{1}{32}(12x + 8\sin 2x + \sin 4x) + C$

2. (a) $\frac{1}{5}\cos^5 x - \frac{1}{3}\cos^3 x + C$

(b) $\frac{1}{7}\sin^7 x - \frac{2}{5}\sin^5 x + \frac{1}{3}\sin^3 x + C$

(c) $\frac{1}{4}u^4 - \frac{1}{6}u^6 + C = \frac{1}{4}\sin^4 x - \frac{1}{6}\sin^6 x + C$

(d) $\frac{1}{32}(4x - \sin 4x) + C$

(e) $\frac{1}{4}\sin^4 x - \sin^2 x + \ln|\sin x| + C$

(f) $\frac{1}{12}\cos^2 x (18 - 9\cos^2 x + 2\cos^4 x) - \ln|\cos x| + C$

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

(b) $-x + \frac{1}{5}\tan^5 x - \frac{1}{3}\tan^3 x + \tan x + C$

(c) $-\frac{1}{4}\cot^4 x + \frac{1}{2}\cot^2 x + \ln|\sin x| + C$

(d) $-x + \frac{1}{5}\cot^5 x - \frac{1}{3}\cot^3 x + \cot x + C$

4. (a) $\frac{1}{6}\tan^6 x + \frac{1}{4}\tan^4 x + C$

(b) $\frac{1}{5}\sec^5 x - \frac{1}{3}\sec^3 x + C$

(c) $\frac{1}{7}\tan^7 x + \frac{1}{5}\tan^5 x + C$

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

$$(e) -\frac{1}{7} \operatorname{cosec}^7 x + \frac{1}{5} \operatorname{cosec}^5 x + C$$

$$(f) -\frac{1}{5} \cot^5 x - \frac{1}{3} \cot^3 x + C$$

$$5. (a) -\frac{1}{6}(\cos 3x + 3\cos x) + C$$

$$(b) \frac{1}{14}(-\cos 7x + 7\cos x) + C$$

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

$$(d) \frac{1}{6}(\sin 3x + 3\sin x) + C$$

[7.6 연습문제]

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

$$(b) \cosh^{-1} u + C = \cosh^{-1} \frac{x}{2} + C$$

$$(c) \frac{1}{3}(2x+3) \sqrt{2x+3} + C$$

$$(d) \frac{2}{9}(3x-1) \sqrt{1-3x} + C$$

$$(e) -\frac{2}{3}(6+x) \sqrt{3-x} + C$$

$$(f) -\frac{2}{5}(24+4x+x^2) \sqrt{3-x} + C$$

$$(g) \ln \left| \frac{\sqrt{2+x} - \sqrt{2-x}}{\sqrt{2+x} + \sqrt{2-x}} \right| + 2 \tan^{-1} \sqrt{\frac{x+2}{2-x}} + C$$

$$(h) -\frac{2}{3}(x+5) \sqrt{1-x} + C$$

$$(i) 6 \left(\frac{1}{7} x^{7/6} - \frac{1}{5} x^{5/6} + \frac{1}{3} x^{1/2} - x^{1/6} + \tan^{-1} x^{1/6} \right)$$

$$(j) \ln |x-2 + \sqrt{x^2-4x+5}| + C$$

$$(k) \frac{\sqrt{3}}{3} \ln \left| \frac{\sqrt{3(1+x)} - \sqrt{1-x}}{\sqrt{3(1+x)} + \sqrt{1-x}} \right| + C$$

$$(l) -\frac{1}{2} \ln \left| \frac{2 + \sqrt{4 - x^2}}{x} \right| + C$$

$$(m) \sqrt{x^2 - 1} + \tan^{-1} \sqrt{x^2 - 1}$$

$$(n) \frac{\sqrt{x^2 + 9}}{3} (x^2 + 9) + C$$

$$2. (a) \frac{\pi}{3}$$

$$(b) \frac{1}{4\sqrt{2}} \ln \frac{(\sqrt{6} - 1)^2 (\sqrt{2} + 1)^2}{7}$$

$$(c) \frac{4 - \sqrt{10}}{3}$$

$$(d) \frac{\pi}{6}$$

$$(e) \frac{1}{12} (4\pi - 3\sqrt{3})$$

$$(f) \frac{2\sqrt{2} - \sqrt{5}}{2}$$

[7.7 연습문제]

$$1. (a) 4 \quad (b) 2 \ln 2 \quad (c) \frac{9}{2} \quad (d) \frac{1}{2}$$

$$2. (a) \frac{1}{6} \quad (b) \frac{343}{6} \quad (c) \frac{1}{6} \quad (d) 4 - 3 \ln 3$$

$$3. (a) \frac{50}{3} \quad (b) \frac{71}{12} \quad (c) 2\sqrt{2} \quad (d) \frac{5}{2}$$

$$4. \sqrt[3]{4}$$

$$5. (a) \frac{\pi^2}{2}$$

$$(b) \frac{\pi}{4} (4 - \pi), \quad x = \frac{\pi}{4}, \quad x = \pi/4$$

$$(c) \frac{\pi^2}{2}$$

$$(d) \frac{3\sqrt{3}}{16} \pi$$

6. (a) $\frac{2\pi}{3}$

(b) $\frac{4\pi}{15}$

(c) $\frac{4\pi}{5}$

(d) $\frac{8\pi}{3}$

(e) $\frac{31\pi}{5}$

(f) $\frac{\pi}{2}$

7. $\frac{64\sqrt{2}\pi 16}{15}$

8. $\frac{4}{3}\pi a^3$

9. (a) $\frac{\sqrt{2} + \ln(1 + \sqrt{2})}{2}$

(b) $\frac{14}{3}$

(c) $8\sqrt{5}$

(d) 76

10. (a) $8\sqrt{5}\pi$

(b) $\frac{\pi}{6} (17\sqrt{17} - 5\sqrt{5})$

[7장 연습문제]

$$7.1 \quad \frac{1}{3}x^3 - 2x + \ln|x| + C$$

$$7.2 \quad \frac{2}{5}x^{5/2} + 2x^{3/2} + 6x^{1/2} - 2x^{-1/2} + C$$

$$7.3 \quad -\frac{2}{3(x^3+1)} + C$$

$$7.4 \quad \sqrt{2x-x^2} + C$$

$$7.5 \quad \frac{2}{3}\sqrt{x^3+3x+4} + C$$

$$7.6 \quad \cos x (-1 + \ln|\cos x|) + C$$

$$7.7 \quad x [(\ln x)^2 - 2\ln x + 2] + C$$

$$7.8 \quad -(x^2 + 2x + 2)e^{-x} + C$$

$$7.9 \quad -\frac{1}{2}x \cos 2x + \frac{1}{4} + C$$

$$7.10 \quad x \tan x + \ln|\cos x| + C$$

$$7.11 \quad \frac{x^2}{4} [1 + 2(\ln x)^2 - 2\ln x]$$

$$7.12 \quad \frac{1}{4}x^4 (-1 + 2\ln x^2) + C$$

$$7.13 \quad \frac{1}{4} \ln \left| \frac{(x-1)^3}{(x+1)(x^2+1)} \right| + C$$

$$7.14 \quad \frac{1}{2} \ln \left| \frac{x(x+2)^2}{(x+1)^4} \right| + C$$

$$7.15 \quad -\frac{2}{45} \sqrt{\cos x} (45 - 18\cos^2 x + 5\cos^4 x) + C$$

$$7.16 \quad \frac{\operatorname{cosec} 2x}{6} (3 - \operatorname{cosec}^2 2x) + C$$

$$7.17 \quad \frac{1}{48} (12x + 2\sin 6x + 3\sin 4x + 6\sin 2x) + C$$

$$7.18 \quad -\frac{1}{8} \cos 2x - \frac{1}{16}$$

$$7.19 \quad 2 \left(\tan^{-1} \sqrt{\frac{x}{2-x}} - \sqrt{x(2-x)} \right) + C$$

$$7.20 \quad 2\sqrt{x+1} + (x+1) + \sqrt{2} \ln \left| \frac{\sqrt{x+1} - \sqrt{2}}{\sqrt{x+1} + \sqrt{2}} \right| + \ln |x-1| + C$$

$$7.21 \quad \frac{9}{4}$$

$$7.22 \quad \frac{1}{2} \ln 2$$

$$7.23 \quad -\frac{1}{2} \ln 2$$

$$7.24 \quad \frac{4}{3}$$

$$7.25 \quad \frac{1}{2}$$

$$7.26 \quad \frac{1 + e^{\pi/2}}{2}$$

$$7.27 \quad \frac{3}{5}(e^{\pi} - 1)$$

$$7.28 \quad \frac{1}{4}(\pi - 2\ln 2)$$

$$7.29 \quad \text{생략}$$

$$7.30 \quad \text{생략}$$

$$7.31 \quad f(x) = 8x^3 - 9x^2 + 1$$

$$7.32 \quad f(x) = \frac{5}{2}x^4 + \frac{3}{2}x^2 - \ln|x| - 3$$

$$7.33 \quad a = 3, \quad f(x) = x^2 - 3x + 2$$

$$7.34 \quad \frac{b^4}{4}$$

$$7.35 \quad c = \ln \frac{e^4 - 1}{4}$$

$$7.36 \quad c = \frac{3\sqrt{3}}{e}$$

$$7.37 \quad \text{최댓값} : f(-2) = 16, \quad \text{최솟값} : f(1) = \frac{1}{4}$$

$$7.38 \quad 1$$

$$7.39 \quad f(x) = \frac{1}{x} \ln x - \frac{1}{2e}, \quad f(1) = -\frac{1}{2e}, \quad f(e) = \frac{1}{2e}$$

$$7.40 \quad (x^2 - 1)(x^2 - 2)$$

$$7.41 \quad 2x^7 - \frac{14}{3}x^6 + 7x^5 - 10x^4 + \frac{7}{3}x^3 + 14x^2$$

$$7.42 \quad -x^2 + 1$$

$$7.43 \quad \frac{\sqrt{1 + \sqrt{x}}}{2\sqrt{x}} - \sqrt{x + 1}$$

$$7.44 \quad x^2 \sqrt{4 + x^2} - 2x^5 \sqrt{4 + x^4}$$

$$7.45 \quad e^{x+2} [\sin(x+2) + \cos(x+2)] - e^x (\sin x + \cos x)$$

$$7.46 \quad x^2 (8 \cos 4x + \cos 2x + 8 \sin 2x - \sin x)$$

$$7.47 \quad 3x - \ln 4x$$

$$7.48 \quad \frac{37}{3}$$

$$7.49 \quad \frac{\pi}{4}$$

$$7.50 \quad \frac{2}{3}(-1 + 2\sqrt{2})$$

$$7.51 \quad \ln 2$$

$$7.52 \quad f(x) = -\frac{1}{x-1} + \tan^{-1}x + \ln\left(\frac{1+x^2}{(x-1)^2}\right)$$

$$7.53 \quad \frac{8}{3}$$

$$7.54 \quad \frac{13}{6}$$

$$7.55 \quad \frac{2}{3}$$

$$7.56 \quad a = 1$$

$$7.57 \quad \frac{39}{2}\pi$$

$$7.58 \quad \text{(a) } 3\pi a^2 \quad \text{(b) } 5\pi^2 a^3$$

$$7.59 \quad \frac{\pi}{30}$$

$$7.60 \quad V_x : V_y = 15 : 16$$

$$7.61 \quad \frac{1}{3}Sh$$

$$7.62 \quad \frac{1}{3}\pi r^2 h$$

$$7.63 \quad 8a$$

$$7.64 \quad 2\pi a$$

$$7.65 \quad \text{(a) } \frac{\pi}{972} \quad \text{(b) } \frac{\pi}{27}$$