

## Section 1.1 확인문제

1. (a) 0000            (b) 0X0X

2. 6

3. (a) 1            (b)  $-3 + 5\sqrt{2}$

4. (a) 2            (b)  $2x$

5.  $A < C < B$

6.  $a - 3b$

7.  $x = 2, y = 6$

8. 0

9. 0

10. 생략

11.  $-4, -2, 0, 2, 4$

## Section 1.2 확인문제

1. (a)  $2x^2 - 4x + 4, -6x + 8$   
 (b)  $-2x^2 + 2x + 1, 4x^2 - 6x - 5$   
 (c)  $2x^2 + 5y^2 - 2xy + 2x - 16y + 13, -3y^2 + 6xy - 10x + 8y - 5$
  
2. (a)  $4a^2 + b^2 + c^2 - 4ab - 2bc + 4ac$   
 (b)  $a^4 - 2a^2b + 2a^2 + b^2 - 2b$   
 (c)  $a^4 - 2a^3 - 13a^2 + 14a + 24$
  
3. (a) 6                      (b)  $\pm 2\sqrt{2}$                       (c) 14                      (d) 34
  
4. (a)  $(a-1)(a-2)$   
 (b)  $(a-3)^2$   
 (c)  $(a-1)(a+1)(a-\sqrt{2})(a+\sqrt{2})$   
 (d)  $(a^2-2a+3)(a^2+2a+3)$
  
5. (a)  $(a+2b+1)(a-b-1)$                       (b)  $(a+b-1)(a+b+3)$   
 (c)  $(a-b)(ab-bc-ca)$                       (d)  $(a-b)(a-b+1)$

6. (a)  $(x-1)(x+1)(x+3)(x+5)$       (b)  $(x-1)(x+1)(x^2+4)$

7.  $a = -5, b = 10$      $x^2 + 2x + 5$

8.  $a = b = 5$

9.  $\sqrt{2} + \sqrt{3}$

10. 빗변이 길이가  $b$ 인 직각삼각형

## Section 1.3 확인문제

1.  $-2$

2. (a)  $a \neq 2$ 이면  $x = -\frac{a+3}{a-2}$

(b)  $a \neq 0, a \neq 1$ 이면  $x = \frac{1}{a}$

3.  $3$

4. (a)  $-3, 1$  (b)  $-2$

5. (a)  $-4, 2$  (b)  $-1 \pm \sqrt{3}i$

6. (a)  $1, \frac{-1 \pm \sqrt{7}i}{2}$  (b)  $\pm 1, \pm \sqrt{2}$

7. (a)  $a < \frac{1}{2}$  (b)  $a = \frac{1}{2}$  (c)  $a > \frac{1}{2}$

## Chapter 01. 연습문제

1. 3

2. 4

3. 2

4.  $4a^2 - 12ab + 9b^2$

5.  $a^3 - 4a^2 + a + 6$

6. 18

7.  $\frac{65}{9}$

8.  $(a-b)(a+b)(a^2+b^2)$

9.  $(a-b)(a^2+ab+b^2)(a^6+a^3b^3+b^6)$

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

11.  $(a+3b-c)(a+3b+c)$

12.  $(x+4)(x+2)(x-1)(x-3)$

13.  $(x+1)(x-2)(x-3)(2x-1)$

14. 4

15.  $a \neq 2$ 이면  $x = \frac{a-4}{a-2}$

16.  $a \neq 0, a \neq 2$ 이면  $x = \frac{1-a}{a(a-2)}$

17. -3, 2

18. 2, 5

19.  $-\frac{1}{2}, 2$

20. -1,  $2\sqrt{2}-2$

21.  $\pm 2$

22. -1, 2

23. -3

24. 9

25.  $b = c$ 인 이등변삼각형

## Section 2.1 확인문제

1. (a)  $\sqrt{13}$       (b)  $\sqrt{2}$       (c)  $\sqrt{13}$       (d)  $\sqrt{2}$

2.  $(3, 2), (-3, -2), (-3, 2)$

3.  $(-2, -2)$

## Section 2.2 확인문제

1. (a) 함수가 아니다. (b)  $\{1, 2, 4\}$   
(c) 함수가 아니다. (d)  $\{1\}$
2. (a)  $\{1, 2, 3, 4, 5\}$  (b) 함수가 아니다. (c)  $\{2, 3, 4\}$
3.  $2 \leq k \leq 4$
4.  $\{x \mid x \leq -1, 0 < x \leq 1\}$



## Section 2.3 확인문제

1.  $\{x|x \geq -1\}, \{x|x \leq 1\}$

2. (a)  $\mathbb{R} - \{2\}, \{y|y > 0\}$  (b)  $\mathbb{R}, \left\{y|y \geq -\frac{1}{4}\right\}$

3.  $a = -3, b = 2, c = 1$

4. 1

5. (a)  $\mathbb{R}$  (b)  $\mathbb{R}$  (c)  $\mathbb{R}$  (d)  $\mathbb{R} - \{-1, 1\}$

6. (a)  $\{x|x \geq 1\}$  (b)  $\left\{x|x \geq \frac{1}{2}\right\}$  (c)  $\{x|1 < x < \sqrt{2}, x > \sqrt{2}\}$

7. (a)  $\mathbb{R}$  (b)  $\mathbb{R}$  (c)  $\mathbb{R} - \{0\}$  (d)  $\mathbb{R} - \{0\}$

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

9.  $h(x) = \frac{1}{2}x - \frac{1}{2}$

## Section 2.4 확인문제

1. (a)  $-2, 1, 2$  (b)  $-\frac{1}{2}, 4, 2$
2. (a)  $y = -x + 5$  (b)  $y = -2x - 2$  (c)  $y = -3x + 5$
3. (a)  $1, x = 1, 2, y = 2$  (b)  $-4, x = \frac{1 \pm \sqrt{3}}{2}, y = 2$
4. (a)  $-x^2 + 2x + 2$  (b)  $2x^2 - x + 1$  (c)  $5x^2 - 3x - 2$
5.  $\pm 4$
6. (a)  $3, -1$  (b)  $8, -7$
7. (a)  $\mathbb{R} - \{0\}, \mathbb{R} - \{2\}$  (b)  $\mathbb{R} - \{2\}, \mathbb{R} - \{1\}$   
 (c)  $-\frac{3\sqrt{2}}{2} \leq x \leq \frac{3\sqrt{2}}{2}, y \geq 1$  (d)  $x \leq -1, x \geq \frac{1}{2}, y \leq 1$
8. (a)  $y = x^2 - 2x + 3$  (b)  $x \leq 1$  (c)  $y \geq 2$

## Chapter 02. 연습문제

1. (a)  $0 \leq x \leq 2$                       (b)  $-4 \leq x \leq 2$
  
2.  $f = h$
  
3.  $\left\{ \frac{1}{2} \right\}$
  
4. 7
  
5. (a) 4                      (b) 16
  
6. (a)  $2\sqrt{x-1}$       (b)  $\sqrt{x-1} + \frac{1}{x^2} - 1$       (c)  $\frac{(1-x^2)\sqrt{x-1}}{x^2}$       (d)  $\frac{x^2\sqrt{x-1}}{1-x^2}$
  
7. (a) 기함수              (b) 기함수              (c) 우함수              (d) 우함수
  
8. (a)  $\sqrt{x^2-1}$               (b)  $x^2-1$               (c)  $x-1$
  
9. (a) 7                      (b) -1                      (c)  $\frac{11}{3}$                       (d)  $\frac{11}{3}$
  
10. 3
  
11.  $a = 2, b = -\frac{1}{2}$

12.  $a = 2, b = -1, c = -2$

13. (a)  $3, \frac{3}{2}$                       (b)  $\frac{9}{4}$

14. 1

15.  $y = 2(x + 1)^2$

16.  $(a, b) = (1, 1), (2, 7)$

17. 7, 7, 49

18.  $a = \frac{1}{2}, b = \frac{9}{4}$

19.  $f(-1) > f(0) > f(1) > f(2)$

20. (a) 전사함수                      (b) 전단사함수                      (c) 단사함수

## Section 3.1 확인문제

1. (a)  $\frac{8}{27}$                       (b)  $2\sqrt[5]{2^3}$                       (c) 8                      (d) 96
2. (a) 1                      (b)  $\frac{5}{2}$                       (c) 3                      (d)  $2\log_3 5$
3. (a)  $\frac{1}{5}$                       (b)  $\frac{1}{27}$
4. (a) 2                      (b) -1
5. (a) 2                      (b)  $3 + \ln 4$                       (c)  $\frac{16}{5}$                       (d)  $2\log_{10} 2$
6. (a) 2                      (b)  $\frac{13}{18}$                       (c)  $\frac{1}{4}(3 - e^{-2})$                       (d)  $e^e$
7. -10
8. 1, 2

## Section 3.2 확인문제

1. (a)  $\mathbb{R}$                       (b)  $\mathbb{R}$                       (c)  $\mathbb{R}$                       (d)  $\mathbb{R} - \{0\}$

2.  $y = 5^{1-x} + 2$

3.  $-\frac{1}{2} \log_2 5$

4. 14

5.  $\alpha = 2, \beta = 3$

6.  $\sinh x = \frac{\sqrt{5}}{2}, \tanh x = \frac{\sqrt{5}}{3}, \operatorname{cosech} x = \frac{2}{\sqrt{5}}, \operatorname{sech} x = \frac{2}{3}, \operatorname{coth} x = \frac{3}{\sqrt{5}}$

## Section 3.3 확인문제

1. (a)  $\mathbb{R} - \{0\}$  (b)  $x < -1, x > 3$
2. 8
3. 6,  $\frac{1}{16}$
4. (a)  $y = \frac{1}{2}(1 - \log_2 x)$  (b)  $y = \frac{1}{2}(3^{x-2} + 1)$
5. 1
6. (a) 1 (b) 1
7. 10
8. 2
9. 2

## Chapter 03. 연습문제

1. 4

2.  $\frac{3}{8}$

3. 4

4.  $\frac{9}{2}$

5.  $\frac{e^2 - 1}{2e}$

6.  $e + \frac{1}{4e}$

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

8. 1

9. 1

10. 3

11.  $\frac{13}{6}$



12.  $\frac{1}{2}$

13.  $-3$

14.  $2\sinh x \cosh y$

15.  $0, 1$

16.  $3^{2-2\sqrt{2}}, 3^{2+2\sqrt{2}}$

17.  $3^{x-1}$

18.  $10$

19.  $1 + 2\log_2 x, 2$

## Section 4.1 확인문제

1. (a)  $\frac{1}{18}\pi$                       (b)  $\frac{11}{18}\pi$                       (c)  $\frac{25}{18}\pi$                       (d)  $\frac{16}{9}\pi$

2.  $\sin A = \frac{12}{13}$ ,  $\cos A = \frac{5}{13}$

3. 밑변  $4\sqrt{2}$ , 높이  $4\sqrt{2}$

4.  $l = \frac{2\pi}{3}$ ,  $S = \frac{4\pi}{3}$

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

6. 제2사분면

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

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

9. (a)  $\sin \theta - \cos \theta$                       (b) 0

10.  $\frac{400}{3}\sqrt{3}(\text{m})$

## Section 4.2 확인문제

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

$$2. -\frac{\sqrt{2}}{4}$$

$$3. (a) \cos \theta + \sin \theta \quad (b) 2\sec \theta$$

$$4. (a) -\frac{\sqrt{2}}{2} \quad (b) -\frac{1}{2} \quad (c) -1$$

$$5. 2\sec \theta$$

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

$$7. (a) \frac{\sqrt{3}}{2}, -\frac{1}{2}, -\sqrt{3} \quad (b) \frac{2\pi}{3}$$

$$8. (a) \frac{\sqrt{6} + \sqrt{2}}{4} \quad (b) \frac{\sqrt{6} + \sqrt{2}}{4} \quad (c) 2 - \sqrt{3}$$

$$9. \frac{4\sqrt{5}}{9}, \frac{1}{9}$$

$$10. -\frac{\sqrt{3-2\sqrt{2}}}{6}, \frac{\sqrt{3+2\sqrt{2}}}{6}$$

$$11. (a) \frac{1}{2}(\sin 4\theta - \sin 2\theta)$$

$$(b) -\frac{1}{2}(\cos 5\theta - \cos 3\theta)$$

$$12. (a) -2\sin 4\theta \sin \theta$$

$$(b) -2\cos 3\theta \sin \theta$$

$$13. \frac{3}{5}, -\frac{4}{5}, -\frac{\sqrt{2}}{10}$$

$$14. (a) 0.3419$$

$$(b) 0.9662$$

$$(c) -0.0875$$

$$15. (a) 2\sin\left(\theta - \frac{\pi}{4}\right), 2\cos\left(\theta - \frac{3\pi}{4}\right)$$

$$(b) 5\sin(\theta + \alpha), \tan \alpha = \frac{4}{3}, 5\cos(\theta - \beta), \tan \beta = \frac{3}{4}$$

## Section 4.3 확인문제

1.  $\frac{1 - \sqrt{3}}{2}$

2. (a)  $\pi, 2, 2, -2$

(b)  $12, \frac{1}{2}, \frac{1}{2}, -\frac{1}{2}$

(c)  $p = 2, \sqrt{2}, \sqrt{2}, -\sqrt{2}$

(d)  $4\pi^2, 1, 1, -1$

3.  $2, -2$

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

(b)  $y = \sqrt{3}x + \sqrt{3} - 1$

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

6.  $5, \frac{1}{2}$

7.  $\frac{\pi}{4}$

8.  $a = 3, b = 3, c = 1$

## Section 4.4 확인문제

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

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

3. (a) 0      (b)  $\frac{4}{\sqrt{17}}$

4.  $\sqrt{1+x^2}$

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

6.  $\frac{\pi}{3}, \pi$

## Chapter 04. 연습문제

1.  $r = 8, l = 2\pi$

2.  $S = 9, r = 3, \theta = 2(\text{rad})$

3.  $\cos \theta = \frac{15}{17}, \tan \theta = \frac{8}{15}, \sec \theta = \frac{17}{15}, \operatorname{cosec} \theta = \frac{17}{8}, \cot \theta = \frac{15}{8}$

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

5.  $-\frac{25}{34}$

6.  $50(1 + \sqrt{3})$

7.  $\frac{8}{5}\pi$

8.  $\frac{7\sqrt{13}}{39}$

9.  $\frac{\sqrt{5}}{3}$

10.  $-\sin \theta + \cos \theta$

11. (a)  $-\frac{1}{8}$  (b)  $\frac{9\sqrt{3}}{16}$

12.  $-\frac{1}{2}$

13.  $\frac{\sqrt{2}}{2}$

14. 1

15. 1

16. 0

17.  $\frac{3\sqrt{3}-\sqrt{7}}{8}, -\frac{3+\sqrt{21}}{8}, \frac{4\sqrt{3}-3\sqrt{7}}{3}$

18.  $\sqrt{\frac{4+\sqrt{6}-\sqrt{2}}{8}}, \sqrt{\frac{4-\sqrt{6}+\sqrt{2}}{8}}$

19. 0

20.  $\sqrt{13}, -\sqrt{13}$

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

22.  $\frac{1}{2}$

23.  $-\frac{\pi}{6}$



24. 0

25.  $\frac{\sqrt{3}}{2}$

26.  $\frac{\pi}{2}$

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

28. 생략

## Section 5.1 확인문제

1. (a)  $-3$                       (b)  $-2$                       (c) 존재하지 않는다.  
(d)  $3$                           (e)  $1$                       (f) 존재하지 않는다.

2. (a)  $-6$                       (b) 존재하지 않는다.

3. (a) 존재하지 않는다.                      (b)  $1$                       (c)  $\frac{1}{3}$                       (d)  $0$

4.  $0$

5. (a)  $1$                       (b)  $1$                       (c)  $-\infty$                       (d)  $\infty$

## Section 5.2 확인문제

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

2.  $\lim_{x \rightarrow 2} g(x) = 4 = g(2)$

3. (a) 2                      (b) 존재하지 않는다.

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

5. (a) 0                      (b) 0

6. 2

7. 생략

## Section 5.3 확인문제

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

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

3. 0

4.  $\frac{\pi}{180}$

## Section 5.4 확인문제

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

## Section 5.5 확인문제

1. (a) 1

(b) 1

2. (a)  $\{x \mid x \leq -3, x \geq 3\}$

(b)  $\{x \mid x \neq 2 \text{인 모든 실수}\}$

3. 4

4.  $\sqrt{3}$

5.  $-4, -3$

6. 1

## Chapter 05. 연습문제

1.  $-1$

2.  $\frac{1}{2}$

3.  $1$

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

5. 존재하지 않는다.

6.  $0$

7.  $-\infty$

8.  $0$

9.  $\frac{2}{3}$

10.  $0$

11.  $3$

12.  $0$

13. 1

14.  $\infty$

15.  $-\frac{1}{2}$

16.  $-\frac{1}{2}$

17.  $a = -2, b = \pi$

18. 1

19. 1

20. (a) 생략                      (b) 1, 0                      (c) 정수가 아닌 모든 실수

21. 3

22. 27

23. 2

24. -1, 1

25. 생략



## Section 6.1 확인문제

1. 미분 가능하지 않다.

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

3.  $y = -x + 1$

4.  $2x - 1$

5.  $-5$

6. (a) 9                      (b)  $-2$

7.  $-\frac{2}{3}$

## Section 6.2 확인문제

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

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

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

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

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

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

5. (a)  $\frac{4x - y^2}{2xy}$

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

(c)  $\frac{y - 2x}{2y - x}$

(d)  $\frac{2y - x}{y - 2x}$

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

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

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

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

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

8.  $y^{(n)} = (-1)^n (n!) x^{-n-1}$

9.  $y = x$

10. 생략

11. 생략

## Section 6.3 확인문제

1. (a)  $\cos x - 3\sin x$  (b)  $-2x \sin(2x^2)$   
 (c)  $\sec x (\tan^2 x + \sec^2 x)$  (d)  $\sin(x^2 - 1) + 2x^2 \cos(x^2 - 1)$
2. (a)  $\ln 2$  (b)  $-4\ln 2$  (c)  $1 + \ln 3$  (d)  $2$
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)  $\frac{2\sinh(\sin^{-1}(2x + 1))}{\sqrt{1 - (2x + 1)^2}}$   
 (c)  $-\frac{x + 1}{x\sqrt{1 - (x + \ln x)^2}}$  (d)  $\frac{\sin x + \cos x}{\sqrt{\sin 2x}}$
6.  $y = -\frac{4 + \pi}{20}x + \frac{16 + 9\pi}{20}$
7.  $y^{(n)} = \sin\left(x + \frac{n\pi}{2}\right)$
8. (a)  $y' = \frac{x^{\sin x}(x \cos x \ln x + \sin x)}{x}$  (b)  $y' = e^x(\sin x + \cos x)$

## Section 6.4 확인문제

1. 0

2. 
$$\frac{3 - 2\sqrt{3}}{3}$$

3. (a) 3.037      (b) 0.495      (c) 0.04      (d) 1.2

4. (a) 1      (b) 1      (c) 1      (d) 1

5. 생략

## Section 6.5 확인문제

1. (a) 감소 :  $x < -1$ ,  $0 < x < 1$ , 증가 :  $-1 < x < 0$ ,  $x > 1$   
 (b) 감소 :  $0 < x < \frac{\pi}{3}$ ,  $\frac{5\pi}{3} < x < 2\pi$ , 증가 :  $\frac{\pi}{3} < x < \frac{5\pi}{3}$   
 (c) 감소 :  $0 < x < 1$ , 증가 :  $x > 1$   
 (d) 감소 :  $x < 0$ ,  $0 < x < 2$ , 증가 :  $x > 2$
  
2.  $a > 0$ 일 때, 감소 :  $x < -\frac{b}{2a}$ , 증가 :  $x > -\frac{b}{2a}$ ,  
 $a < 0$ 일 때, 감소 :  $x > -\frac{b}{2a}$ , 증가 :  $x < -\frac{b}{2a}$
  
3. (a) 극댓값 :  $\frac{3}{4}(-3 + 2\sqrt{3})$ , 극솟값 :  $0$ ,  $-\frac{3}{4}(3 + 2\sqrt{3})$   
 (b) 극댓값 :  $\sqrt{2}$ , 극솟값 :  $-\sqrt{2}$   
 (c) 극댓값 :  $2$ , 극솟값 :  $-2$   
 (d) 극솟값 :  $-e^{-1}$
  
4. (a) 극댓값(최댓값) :  $4$ , 극솟값(최솟값) :  $0$   
 (b) 극댓값 :  $2$ , 극솟값 :  $6$ , 최솟값과 최댓값은 존재안함.  
 (c) 극솟값(최솟값) :  $-e^{-1}$ , 최댓값 :  $2\ln 2$   
 (d) 극댓값(최댓값) :  $\frac{512}{25\sqrt{5}}$ , 극솟값(최솟값) :  $0$   
 (e) 극솟값(최솟값) :  $-e^{-1}$ , 최댓값 :  $e$   
 (f) 극댓값(최댓값) :  $\sqrt{2}$ , 극솟값(최솟값) :  $-\sqrt{2}$

5. (a) 아래로 볼록 :  $x < -\sqrt{\frac{2}{5}}, x > \sqrt{\frac{2}{5}},$

위로 볼록 :  $-\sqrt{\frac{2}{5}} < x < \sqrt{\frac{2}{5}}$

(b) 아래로 볼록 :  $x > 0$ , 위로 볼록:  $x < 0$

(c) 아래로 볼록 :  $x > 0$

(d) 아래로 볼록 :  $x < -2 - \sqrt{2}, x > -2 + \sqrt{2},$

위로 볼록 :  $-2 - \sqrt{2} < x < -2 + \sqrt{2}$

6. 극댓값  $\frac{e^{-\pi/4}}{\sqrt{2}},$  극솟값  $-\frac{e^{-5\pi/4}}{\sqrt{2}}$

7. 생략

8.  $128\text{cm}^3$

9. (a)  $4\text{ cm/s}$       (b)  $\frac{5}{12}\text{ cm}$

## Chapter 06. 연습문제

1.  $8x + 12$

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

3. 0

4. 존재하지 않는다.

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

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

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

8. 0

9.  $(1 + 2\cos 2x)\sec^2(x + \sin 2x)$

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

11.  $\frac{4}{5}$

12.  $-\frac{49}{37}$

13. 1

14.  $\ln 4$

15.  $e^{-1}$

16. 0

17. 생략

18. 생략

19.  $5400\pi\text{cm}^2$

20. 5 cm

21. 3750(m)

22. 1000(km)



## Section 7.1 확인문제

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

(b)  $x - x^2 + \sin x + C$

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

(d)  $\tan x + \ln(2x + 1)$

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)  $x - 2\tan^{-1}x + C$

(e)  $x - 4\sqrt{x} + \ln|x| + C$

(f)  $2\sin^{-1}x + C$

(g)  $x - \cos x - 2\sin x + C$

(h)  $\tan x + \cot x + C$

(i)  $\frac{2^x}{\ln 2} + 3e^x + C$

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

(k)  $\cosh x + 2\sinh x + C$

(l)  $2\tanh x - 3\coth x + C$

3.  $x + \frac{2}{3}x^{3/2} - 2$

4. (a)  $x - \cos x - 2$

(b)  $x^2 + 1 - 3\ln|x|$

5.  $-2\ln|x| + 1$

6. (a)  $-4$

(b)  $\frac{22}{3}$

7. (a)  $a = -2, \frac{1}{3}x^3 - x^2 - x + \frac{10}{3}$

(b)  $a = -1, \frac{1}{3}x^3 - \frac{1}{2}x^2 - x + \frac{1}{6}$

## Section 7.2 확인문제

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

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

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

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

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

(i)  $\ln|\sin x| + C$

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

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

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

2. (a)  $-(x^2 + 2x + 2)e^{-x} + C$

(b)  $(x^2 - x + 2)e^x + C$

(c)  $x \sin x + \cos x + C$

(d)  $-(x^2 - 2)\cos x + 2x \sin x + C$

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

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

(g)  $\frac{1}{2}e^x(\sin x + \cos x) + C$

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

(i)  $x \sin^{-1} x + \sqrt{1-x^2} + C$

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

(k)  $\frac{1}{2}x^2 \tan^{-1} x - \frac{1}{2}(x - \tan^{-1} x) + C$

(l)  $\frac{1}{3}x^3 \tan^{-1} x - \frac{1}{6}(x^2 - \ln(1+x^2)) + C$

3. (a)  $\frac{e^{ax}}{a^2 + b^2}(a \sin bx - b \cos bx) + C$

(b)  $\frac{e^{-2x}}{13}(-2 \sin 3x - 3 \cos 3x) + C$

## Section 7.3 확인문제

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)  $\frac{1}{2}(e^{\pi/2} + 1)$  (i)  $\frac{\pi}{2} - 1$  (j)  $\frac{\pi - 2}{4}$

2.  $\frac{1}{4}$

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

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

5. 6

6.  $\frac{3}{2}$

7. (a)  $3x^2 - 2x$  (b) 100

8.  $4x^3 - 3x^2 + 1, a = 1$

9. (a)  $x^2 + 1$  (b)  $\frac{\sqrt{1 + \sqrt{x}}}{2\sqrt{x}} - \sqrt{x + 1}$

## Section 7.4 확인문제

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

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

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

(d)  $\ln|x-1| - \frac{4x-3}{2(x-1)^2} + C$

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

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

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

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

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

(d)  $2 \tan^{-1} x + \frac{1}{2} \ln \frac{x^2}{1+x^2} + C$

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

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

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

(h)  $\frac{1}{2} \ln(1+x^2) - \tan^{-1} x + \frac{1}{1+x^2} + C$

3. (a)  $\frac{\ln 5}{3}$

(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)  $\frac{1}{8}(-\pi + 6 \ln 2)$

4.  $1 + \ln \left| \frac{x-2}{2(x-1)} \right|$

## Section 7.5 확인문제

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

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

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

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

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

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

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)  $\frac{1}{4}\sin^4 x - \frac{1}{6}\sin^6 x + C$

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

(e)  $\frac{1}{16}\left(x - \frac{\sin 4x}{4} + \frac{\sin^3 2x}{3}\right) + C$

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

(g)  $2\sqrt{\sin x} - \frac{4}{5}\sin^2 x \sqrt{\sin x} + \frac{2}{9}\sin^4 x \sqrt{\sin x} + C$

(h)  $\frac{2}{13}\cos^{13/2} x - \frac{2}{3}\cos^{9/2} x + \frac{6}{5}\cos^{5/2} x - 2\cos^{1/2} x + C$

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

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

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

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

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

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

$$(j) -\tan x + \ln \left| \frac{1 + \tan x}{-1 + \tan x} \right| + C$$

$$4. (a) -\frac{1}{6} (\cos 3x + 3 \cos x) + C$$

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

$$(c) \frac{1}{4} \left( -\frac{1}{10} \cos 10x + \frac{1}{6} \cos 6x - \frac{1}{4} \cos 4x \right) + C$$

$$(d) \frac{1}{4} \left( x + \frac{1}{6} \sin 6x + \frac{1}{4} \sin 4x + \frac{1}{2} \sin 2x \right) + C$$

$$5. (a) \frac{1}{2}$$

$$(b) \frac{\sqrt{2}}{4}$$

$$(c) 0$$

$$(d) \frac{2}{35}$$

$$(e) \frac{4}{3}$$

$$(f) \frac{\pi}{4} - \frac{2}{3}$$

$$(g) \frac{2}{105} (-4 + 11\sqrt{2})$$

$$(h) 2 - 2 \ln 2$$

## Section 7.6 확인문제

1. (a)  $\frac{2}{3}(x-4)\sqrt{x-4} + C$  (b)  $2\sqrt{x+2} + C$
- (c)  $\frac{1}{2}\ln\left|\frac{-2+\sqrt{4-x}}{2+\sqrt{4-x}}\right| + C$  (d)  $-\frac{2}{5}\sqrt[4]{(1-2x)^5} + C$
- (e)  $-\frac{2}{3}(6+x)\sqrt{3-x} + C$  (f)  $2\tan^{-1}\sqrt{x} + C$
- (g)  $\frac{3}{5}\sqrt[3]{(1-x)^5} - \frac{3}{2}\sqrt[3]{(1-x)^2} + C$  (h)  $-\frac{2}{3}(x+5)\sqrt{1-x} + C$
- (i)  $\frac{3}{5}\sqrt[3]{x^5} - \frac{3}{4}\sqrt[3]{x^4} + x - \frac{3}{2}\sqrt[3]{x^2} + 3\sqrt[3]{x} - 3\ln|1+\sqrt[3]{x}| + C$
- (j)  $\frac{2}{3}\sqrt{x^3} + x + 4\sqrt{x} + 4\ln|-1+\sqrt{x}| + C$
2. (a)  $\sin^{-1}\frac{x}{2} + C$  (b)  $\ln|x+\sqrt{x^2-4}| + C$
- (c)  $\sin^{-1}\frac{x+1}{2} + C$  (d)  $\ln|x-2+\sqrt{x^2-4x+5}| + C$
- (e)  $-\frac{1}{2}\ln\left|\frac{2+\sqrt{4-x^2}}{x}\right| + C$  (f)  $-\frac{\sqrt{4-x^2}}{4x} + C$
- (g)  $\sqrt{x^2-1} + \tan^{-1}\sqrt{x^2-1} + C$  (h)  $\frac{\sqrt{x^2+9}}{3}(x^2+9) + C$



3. (a)  $\frac{\pi}{4}$

(b)  $\frac{\pi}{3} - \frac{\sqrt{3}}{2}$

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

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

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

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

4.  $\frac{1}{4} \left[ (2x^2 - 1) \sin^{-1} x + x \sqrt{1 - x^2} \right] + C$

## Section 7.7 확인문제

1. (a) 2                      (b)  $2\ln 2$                       (c)  $\frac{9}{2}$                       (d)  $-2 + 3\ln 3$

2. (a)  $\frac{9}{2}$                       (b)  $\frac{343}{6}$                       (c)  $\frac{1}{6}$                       (d)  $\frac{1}{2}$

3. (a)  $\frac{1}{12}$                       (b)  $\frac{96}{5}$                       (c)  $\frac{8}{3}$                       (d)  $\pi - \frac{2}{3}$

4. (a)  $\frac{32\pi}{5}$                       (b)  $\frac{7\pi}{24}$                       (c)  $\frac{\pi}{30}$                       (d)  $\frac{\pi^2}{16}$

5. (a)  $\frac{31\pi}{5}$                       (b)  $\frac{\pi}{2}$                       (c)  $\frac{\pi}{2}(e^4 - 4e^2 + 7)$                       (d)  $\frac{3\pi}{2}$

6.  $\frac{32\pi}{5}$

7.  $\frac{a^2 h}{3} \pi$

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

9.  $8\sqrt{5} \pi$

## Chapter 07. 연습문제

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

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

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

$$4. \sqrt{2x-x^2} + C$$

$$5. \frac{2}{3}\sqrt{x^3+3x+4} + C$$

$$6. \cos x (-1 + \ln|\cos x|) + C$$

$$7. x [(\ln x)^2 - 2\ln x + 2] + C$$

$$8. -(x^2 + 2x + 2)e^{-x} + C$$

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

$$10. \frac{1}{2}x\sin 2x + \frac{1}{4}\cos 2x + C$$

$$11. \frac{x^2}{4} [1 + 2(\ln x)^2 - 2\ln x] + C$$

$$12. \frac{1}{4} x^4 (-1 + 2\ln x^2) + C$$

$$13. x + \frac{1}{2} \ln |1 - x^2| + C$$

$$14. \frac{3}{4} \ln \left| \frac{x-1}{x+1} \right| - \frac{1}{2} \tan^{-1} x + C$$

$$15. -\frac{2}{45} \sqrt{\cos x} (45 - 18\cos^2 x + 5\cos^4 x) + C$$

$$16. \frac{\operatorname{cosec} 2x}{6} (3 - \operatorname{cosec}^2 2x) + C$$

$$17. -\frac{1}{10} (\cos 5x + 5\cos x) + C$$

$$18. \frac{1}{10} (5\cos x - \cos 5x) + C$$

$$19. -\frac{2}{3} (x+4) \sqrt{2-x} + C$$

$$20. -\frac{1}{2} \left[ \frac{\sqrt{1+x^2}}{x^2} + \ln \left( \frac{1 + \sqrt{1+x^2}}{x} \right) \right] + C$$

21.  $1 - \frac{\pi}{2}$

22.  $\frac{1}{2} \ln 2$

23.  $3(e-1) + \frac{1}{\ln 2}$

24. 4

25.  $\frac{1}{2}$

26.  $\frac{1+e^2}{4}$

27.  $\frac{3}{5}(e^\pi - 1)$

28.  $\frac{1}{2} \ln \frac{8}{5}$

29.  $\frac{\pi}{2}$

30.  $\frac{1}{4}(\pi - 2\ln 2)$

31.  $8x^3 - 9x^2 + 1$

32.  $\ln \frac{e^4 - 1}{4}$

33.  $\sin x - \cos x + 2$

34.  $(x^2 - 1)(x^2 - 2)$

35.  $2x^7 - \frac{14}{3}x^6 + 7x^5 - 10x^4 + \frac{7}{3}x^3 + 14x^2$

36.  $-x^2 + 1$

37.  $\frac{\sqrt{1 + \sqrt{x}}}{2\sqrt{x}} - \sqrt{x + 1}$

38.  $\frac{37}{3}$

39.  $\frac{\pi}{4}$

40.  $2\sqrt{3}$

41.  $\frac{27}{4}$

42.  $\frac{e}{2} - 1$

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

44.  $\frac{117}{5}\pi$

45.  $\frac{\pi}{6}$

46.  $\frac{\pi}{2}$

47.  $2\pi$

48.  $\frac{39}{2}\pi$

49.  $2\pi a$

50.  $\frac{\pi}{30}$