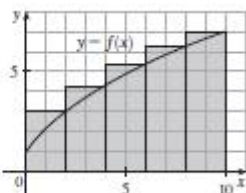
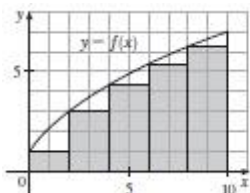


부록 E 해답

4장

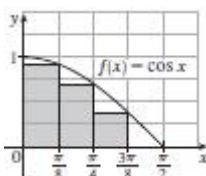
연습문제 4.1

01. (a) 40, 52;



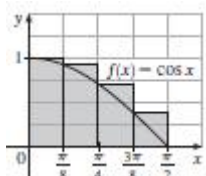
(b) 43.2, 49.2

02. (a) 0.7908;



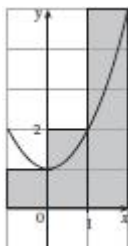
; 과소평가

(b) 1.1835;

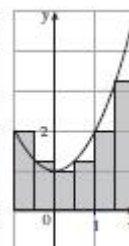
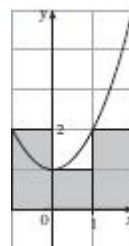


; 과대평가

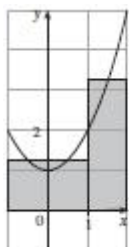
03. (a) 8, 6.875;



(b) 5, 5.375;

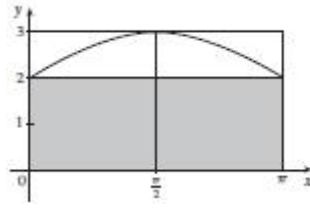


(c) 5.75, 5.9375;

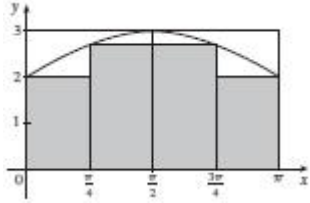


(d) M_6

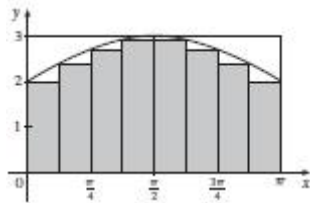
04. $n = 2$ 인 경우: 상합 $= 3\pi \approx 9.42$, 하합 $= 2\pi \approx 6.28$



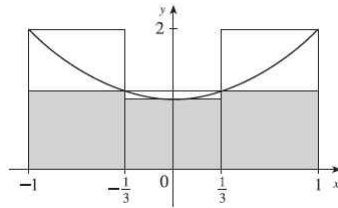
$n = 4$ 인 경우: 상합 $= (10 + \sqrt{2})(\pi/4) \approx 8.96$, 하합 $= (8 + \sqrt{2})(\pi/4) \approx 7.39$



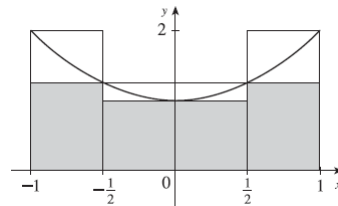
$n = 8$ 인 경우: 상합 ≈ 8.65 , 하합 ≈ 7.86



05. $n = 3$ 인 경우: 상합 ≈ 3.41 , 하합 ≈ 2.15



$n = 4$ 인 경우: 상합 $= 3.25$, 하합 $= 2.25$



06. 10.55 m, 13.65 m

07. 63.2 L, 70 L

08. 39 m

09. $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{2(1+2i/n)}{(1+2i/n)^2 + 1} \cdot \frac{2}{n}$

10. 0에서 $\pi/4$ 까지 $y = \tan x$ 의 그래프 아래의 넓이

11. (a) $L_n < A < R_n$ (b) 생략 (c) 생략

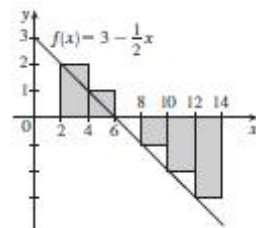
$$12. (a) \lim_{n \rightarrow \infty} \frac{64}{n^6} \sum_{i=1}^n i^5 \quad (b) \frac{n^2(n+1)^2(2n^2+2n-1)}{12} \quad (c) \frac{32}{3}$$

$$13. \sin b, 1$$

연습문제 4.2

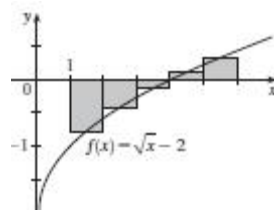
01. -6

리만 합은 x 축 위에 있는 두 개의 직사각형 넓이의 합에서 x 축 아래에 있는 세 개의 직사각형 넓이의 합을 뺀 것을 나타낸다. 즉, x 축에 대한 직사각형들의 순 넓이이다.



02. -0.856759

리만 합은 x 축 위에 있는 두 개의 직사각형 넓이의 합에서 x 축 아래에 있는 세 개의 직사각형 넓이의 합을 뺀 것을 나타낸다.



03. -0.028 04. (a) 6 (b) 4 (c) 2

05. 아래쪽 추정값, $L_5 = -64$; 위쪽 추정값, $R_5 = 16$

$$06. 6.1820 \quad 07. 0.9071 \quad 08. \int_2^6 \frac{1-x^2}{4+x^2} dx$$

$$09. \int_2^7 (5x^3 - 4x) dx \quad 10. -9 \quad 11. \frac{2}{3} \quad 12. -\frac{3}{4}$$

$$13. \lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{2+4i/n}{1+(2+4i/n)^5} \cdot \frac{4}{n} \quad 14. \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\sin \frac{5\pi i}{n} \right) \frac{\pi}{n} = \frac{2}{5}$$

$$15. (a) 4 \quad (b) 10 \quad (c) -3 \quad (d) 2 \quad 16. \frac{3}{2} \quad 17. 3 + \frac{9}{4}\pi$$

$$18. \frac{5}{2} \quad 19. 0 \quad 20. \int_{-1}^5 f(x) dx \quad 21. 122 \quad 22. 3$$

$$23. 15 \quad 24. \text{생략} \quad 25. \frac{1}{2} \leq \int_1^2 \frac{1}{x} dx \leq 1$$

$$26. \frac{\pi}{12} \leq \int_{\pi/4}^{\pi/3} \tan x dx \leq \frac{\pi}{12} \sqrt{3} \quad 27. \int_0^1 x^4 dx$$

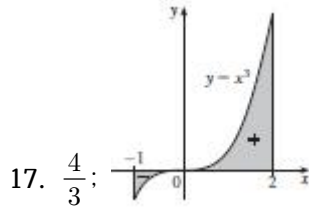
연습문제 4.3

01. $\frac{364}{3}$ 02. 18 03. -2 04. 8 05. 36 06. $\frac{55}{63}$

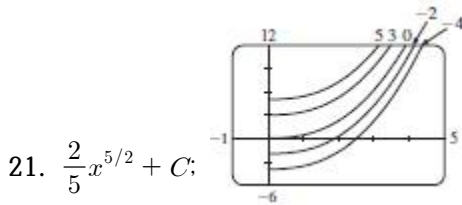
07. $2\sqrt{5}$ 08. 1 09. $1 + \pi/4$ 10. $\frac{49}{3}$ 11. $\frac{256}{5}$ 12. 1

13. $\frac{256}{15}$ 14. $\frac{5}{2}$ 15. -3.5

16. 함수 $f(x) = 1/x^2$ 은 구간 $[-1, 3]$ 에서 연속이 아니므로 정적분의 기본정리를 적용할 수 없다.



17. $\frac{4}{3}$; 18. 2 19. 3.75 20. 생략



21. $\frac{2}{5}x^{5/2} + C$; 22. $\frac{1}{3}x^3 - \frac{1}{x} + C$

23. $\frac{2}{3}u^3 + \frac{9}{2}u^2 + 4u + C$ 24. $\sec x + C$ 25. $\frac{4}{3}$

26. 5살에서 10살 사이에 아이들의 몸무게(kg)의 증가량

27. 처음 두 시간 동안 새어나온 기름의 양(L)

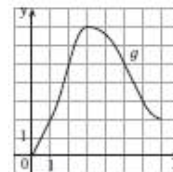
28. 생산량이 1000단위에서 5000단위로 증가할 때, 수익의 증가

29. 뉴턴-미터($N \cdot m$) 30. (a) $-\frac{3}{2}m$ (b) $\frac{41}{6}m$

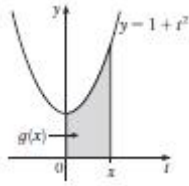
31 (a) $v(t) = \frac{1}{2}t^2 + 4t + 5m/s$ (b) $416\frac{2}{3}m$

32. 1.4mi 33. 1800L

연습문제 4.4



01. (a) 0, 2, 5, 7, 3 (b) (0, 3) (c) $x = 3$ (d)



02. $g'(x) = 1 + x^2$

03. $g'(x) = 1/(x^3 + 1)$

04. $g'(s) = (s - s^2)^8$

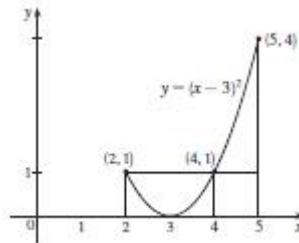
05. $h'(x) = -\sin^4(1/x)/x^2$

06. $y' = \sqrt{\tan x} + \sqrt{\tan x} \sec^2 x$

07. $g'(x) = \frac{-2(4x^2 - 1)}{4x^2 + 1} + \frac{3(9x^2 - 1)}{9x^2 + 1}$

08. $\frac{45}{28}$

09. $2/\pi$

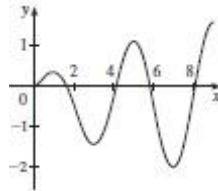


10. (a) 1 (b) 2, 4 (c)

11. $\frac{9}{8}$

12. $(-4, 0)$

13. (a) 1과 5에서 극댓값; 3과 7에서 극솟값 (b) $x = 9$



(c) $(\frac{1}{2}, 2)$, $(4, 6)$, $(8, 9)$ (d)

14. 29

15. (a) $-2\sqrt{n}$, $\sqrt{4n-2}$, n 은 0보다 큰 정수

(b) $(0, 1)$, $(-\sqrt{4n-1}, -\sqrt{4n-3})$, $(\sqrt{4n-1}, \sqrt{4n+1})$, n 은 0보다 큰 정수

(c) ≈ 0.74

16. $f(x) = x^{3/2}$, $a = 9$

17. (a) 생략 (b) $[0, t]$ 에서 평균 지출; 평균 지출을 최소화 한다. (c) 생략

연습문제 4.5

01. $-(1/\pi) \cos \pi x + C$

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

03. $-\frac{1}{4} \cos^4 \theta + C$

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

05. $-\frac{1}{20}(1-2x)^{10} + C$

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

07. $\frac{1}{3} \sec 3t + C$

08. $\frac{2}{3} \sqrt{3ax+bx^3} + C$

09. $\frac{1}{4} \tan^4 \theta + C$

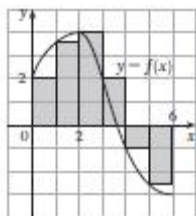
10. $\frac{1}{15}(x^3 + 3x)^5 + C$ 11. $-\frac{1}{\sin x} + C$ 12. $-\frac{2}{3}(\cot x)^{3/2} + C$
13. $\frac{1}{3} \sec^3 x + C$ 14. $\frac{1}{2}(1+z^3)^{2/3} + C$
15. $\frac{1}{40}(2x+5)^{10} - \frac{5}{36}(2x+5)^9 + C$ 16. $2/\pi$ 17. $\frac{45}{28}$ 18. 4
19. $\frac{1}{3}(2\sqrt{2}-1)a^3$ 20. $\frac{16}{15}$ 21. $\frac{1}{2}(\sin 4 - \sin 1)$ 22. 0
23. $\frac{8}{3}$ 24. $2/(5\pi)$ 25. 6π 26. $\frac{5}{4\pi}\left(1 - \cos \frac{2\pi t}{5}\right)L$
27. 5 28. 생략 29. 생략

4장 복습문제

참-거짓 질문

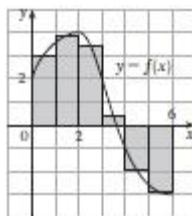
01. 참 02. 참 03. 거짓 04. 참 05. 참 06. 거짓
07. 참 08. 거짓 09. 거짓

연습문제



01. (a) 8;

(b) 5.7;



02. $\frac{1}{2} + \frac{\pi}{4}$ 03. $f = c, f' = b, \int_0^x f(t) dt = a$ 04. 37 05. $\frac{9}{10}$
06. -76 07. $\frac{21}{4}$ 08. $\frac{1}{3} \sin 1$ 09. 0 10. $\frac{1}{2}\sqrt{2} - \frac{1}{2}$
11. $\sqrt{x^2 + 4x} + C$ 12. $\frac{1}{2\pi} \sin^2 \pi t + C$ 13. $\frac{23}{3}$
14. $\frac{64}{5}$ 15. $F'(x) = \sqrt{1+x^4}$ 16. $y' = \frac{2 \cos x - \cos \sqrt{x}}{2x}$
17. $4 \leq \int_1^3 \sqrt{x^2 + 3} dx \leq 4\sqrt{3}$ 18. 1.11
19. 2000년 1월 1일부터 2003년 1월 1일까지 소비된 기름의 배럴 수
20. 72400 21. $f(x)$ 22. $f(x)$