

연습문제 해답

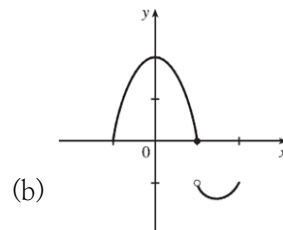
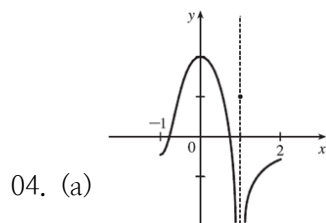
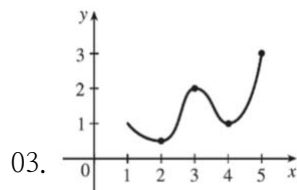
게시 일자 : 2018-03-30

4장

도함수의 응용

4.1 최댓값과 최솟값

01. 최솟값 : 함수의 전체 정의역에서 가장 작은 함수값
 c 에서 극솟값 : c 부근에 있는 x 에 대해 가장 작은 함수값
02. 최댓값 : $f(4) = 5$, 최솟값 : 없음
 극댓값 : $f(4) = 5$ 와 $f(6) = 4$, 극솟값 : $f(2) = 2$ 와 $f(1) = f(5) = 3$



05. 최댓값 : 없음, 최솟값 : $f(0) = 0$, 극댓값 : 없음, 극솟값 : 없음
06. 최댓값 : $f(0) = 1$, 최솟값 : 없음, 극댓값 : 없음, 극솟값 : 없음
07. $0, \frac{8}{7}, 4$
08. $n\pi$ (n 은 정수)
09. 최댓값 : 8, 최솟값 : -19

10. 최댓값 : $\frac{3}{2}\sqrt{3}$, 최솟값 : 0

11.
$$\frac{a^a b^b}{(a+b)^{a+b}}$$

12. (a) 0.32, 0 (b) 최댓값 : $\frac{3\sqrt{3}}{16}$, 최솟값 : 0

13. $\approx 3.9665^\circ\text{C}$

14. 가장 쬘 때 : $t \approx 0.855$ (1994년 6월)
가장 비쬘 때 : $t \approx 4.618$ (1998년 3월)

15. 생략

16. 생략

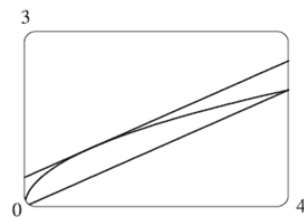
4.2 평균값 정리

01. 2

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

03. 생략

04. $c = 1$



05. $c = 1$

06. 생략

07. 생략

08. 16

09. 생략

10. 생략

4.3 도함수와 그래프의 모양

01.

(a) 증가구간 : $(-\infty, -3)$, $(2, \infty)$, 감소구간 : $(-3, 2)$

(b) 극댓값 : 81, 극솟값 = -44

(c) 위로 오목 : $(-\frac{1}{2}, \infty)$, 아래로 오목 : $(-\infty, -\frac{1}{2})$, 변곡점 : $(-\frac{1}{2}, \frac{37}{2})$

02.

(a) 증가구간 : $(0, \frac{\pi}{4})$, $(\frac{5\pi}{4}, 2\pi)$, 감소구간 : $(\frac{\pi}{4}, \frac{5\pi}{4})$

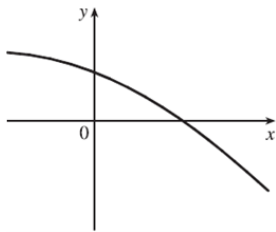
(b) 극댓값 : $\sqrt{2}$, 극솟값 = $-\sqrt{2}$

(c) 위로 오목 : $(\frac{3\pi}{4}, \frac{7\pi}{4})$, 아래로 오목 : $(0, \frac{3\pi}{4})$, $(\frac{7\pi}{4}, 2\pi)$, 변곡점 : $(\frac{3\pi}{4}, 0)$, $(\frac{7\pi}{4}, 0)$

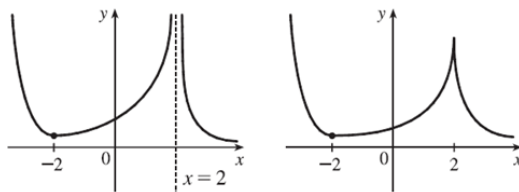
03. 극댓값 : 2, 극솟값 = 1

04. (a) f 는 2에서 극댓값을 갖는다.

(b) f 는 6에서 수평접선을 갖는다.



05.



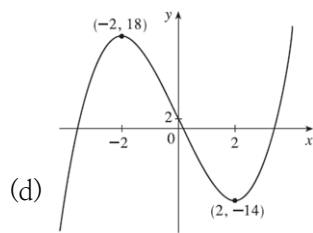
06.

07.

(a) 증가구간 : $(-\infty, -2)$, $(2, \infty)$, 감소구간 : $(-2, 2)$

(b) 극댓값 : 18, 극솟값 : -14

(c) 위로 오목구간 : $(0, \infty)$, 아래로 오목구간 : $(-\infty, 0)$, 변곡점 : $(0, 2)$

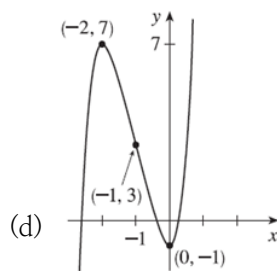


08.

(a) 증가구간 : $(-\infty, -2)$, $(0, \infty)$, 감소구간 : $(-2, 0)$

(b) 극댓값 : 7, 극솟값 : -1

(c) 위로 오목구간 : $(-\infty, -1)$, 아래로 오목구간 : $(-1, \infty)$, 변곡점 : $(-1, 3)$



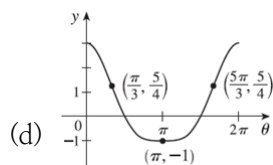
09.

(a) 증가구간 : $(\pi, 2\pi)$, 감소구간 : $(0, \pi)$

(b) 극댓값 : 없음, 극솟값 : -1

(c) 위로 오목구간 : $(\frac{\pi}{3}, \frac{5\pi}{3})$, 아래로 오목구간 : $(0, \frac{\pi}{3})$, $(\frac{5\pi}{3}, 2\pi)$

변곡점 : $(\frac{\pi}{3}, \frac{5}{4})$, $(\frac{5\pi}{3}, \frac{5}{4})$



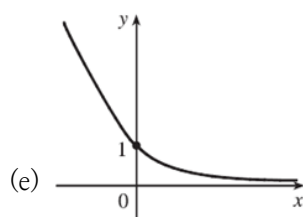
10.

(a) 수평접근선 $y = 0$

(b) 감소구간 $(-\infty, \infty)$

(c) 극댓값, 극솟값 없음

(d) 위로 오목구간 $(-\infty, \infty)$

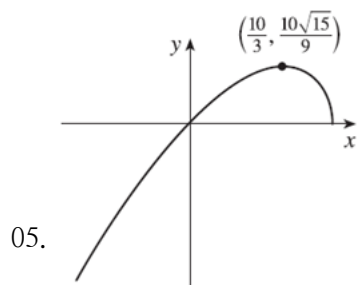
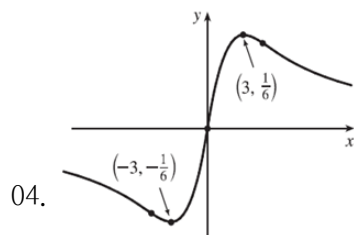
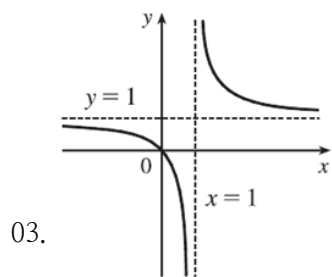
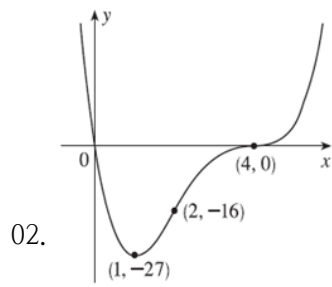
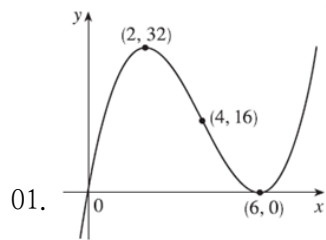


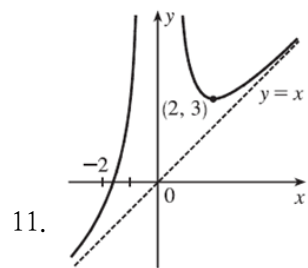
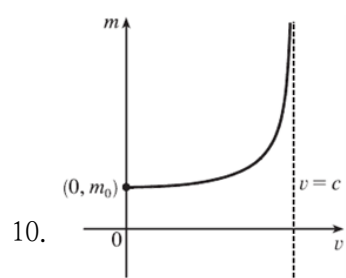
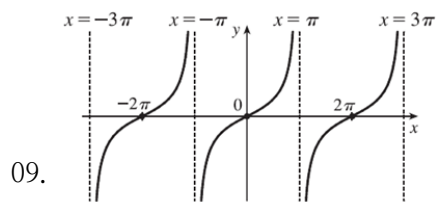
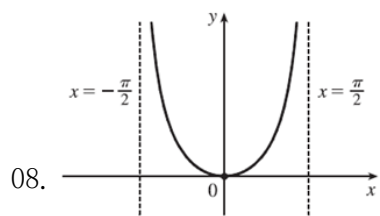
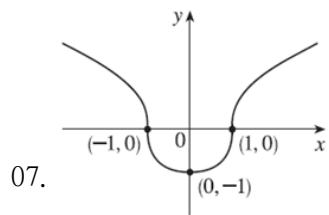
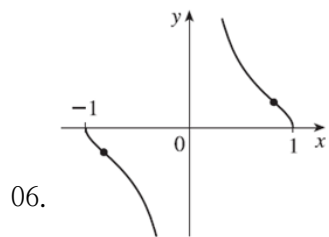
11. $(3, \infty)$

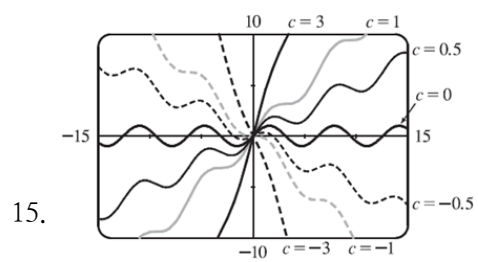
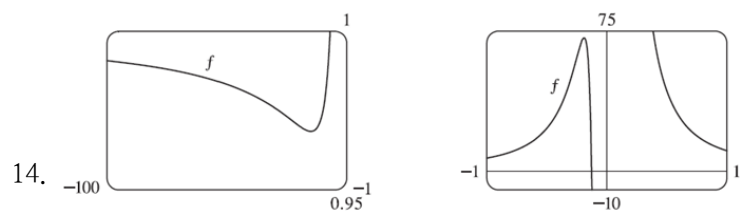
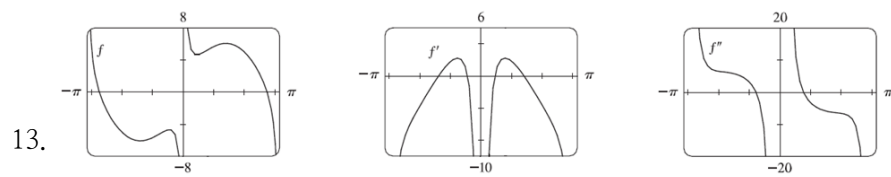
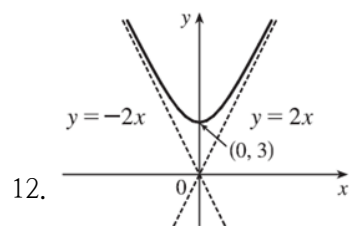
12. $f(x) = \frac{1}{9}(2x^3 + 3x^2 - 12x + 7)$

13. ~ 15. 생략

4.4 곡선 그리기







4.5 부정형과 로피탈 법칙

01. 2

02. 2

03. $-\infty$

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

05. $-\frac{1}{\pi^2}$

06. $\frac{1}{24}$

07. 0

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

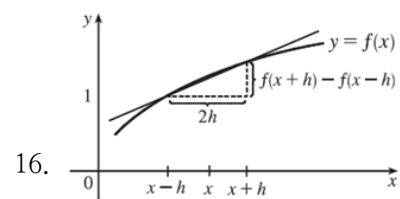
09. 1

10. $\frac{1}{e}$

11. ~ 13. 생략

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

15. 56



4.6 최적화 문제

01.

(a) 첫 번째 수 두 번째 수 곱

1	22	22
2	21	42
3	20	60
4	19	76
5	18	90
6	17	102
7	16	112
8	15	120
9	14	126
10	13	130
11	12	132

(b) 생략

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

03. 4000 cm^3

04. $(-\frac{6}{5}, \frac{3}{5})$

05. $\frac{L}{2}, \frac{\sqrt{3}}{4}L$

06. 너비 $\frac{20}{4+\pi}$ 미터, 직사각형의 높이 $\frac{10}{(4+\pi)}$ 미터

07. $\frac{2}{9\sqrt{3}}\pi R^3$

08. $\frac{E^2}{4r}$

09. $\approx 2.4\text{ m}$

10. $2\sqrt{6}$

11. 생략

12. $\frac{1}{2}(L + W)^2$

13.

(a) $I(x) = \frac{k}{x^2 + d^2} + \frac{k}{(10 - x)^2 + d^2} = \frac{k}{x^2 + d^2} + \frac{k}{x^2 - 20x + 100 + d^2}$

(b) 생략

(c) 생략

(d) $5\sqrt{2}$

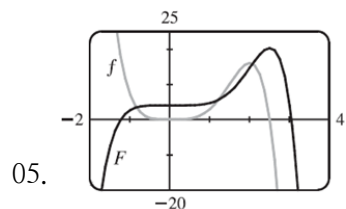
4.7 역도함수

01. $\frac{1}{2}x + \frac{1}{4}x^3 - \frac{1}{5}x^4 + C$

02. $2x^{3/2} - \frac{3}{2}x^{4/3} + C$

03. $-2 \cos \theta - \tan \theta + C_n$

04. $\frac{1}{2}x^2 - x - \frac{1}{x^2} + C_2$



06. $x^5 - x^4 + x^3 + Cx + D$

07. $-\sin t + Ct^2 + Dt + E$

08. $2 \sin t + \tan t + 4 - 2\sqrt{3}$

09. $-\sin \theta - \cos \theta + 5\theta + 4$

10. $-\ln x + (\ln 2)x - \ln 2$

11. 10

12. 생략

13. $-10 \sin t - 3 \cos t + \frac{6}{\pi}t + 3$

14. 생략

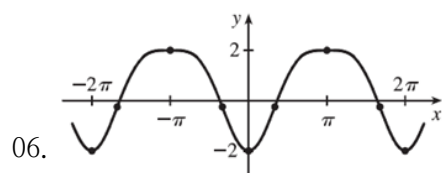
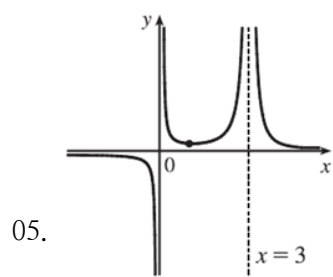
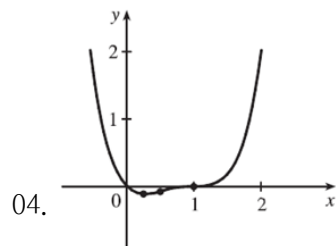
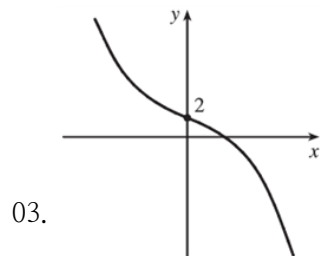
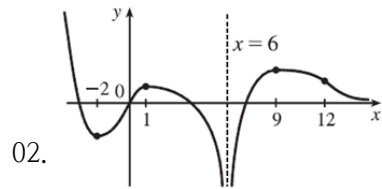
15. $\approx 11.8\text{s}$

16. $-62,500 \text{ km/h}^2$ 또는 $\approx 4.82 \text{ m/s}^2$

4장 복습문제

연습문제

01. 극값 : 1, 최댓값 : 5, 최솟값 : 1



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

08. 0

09. $-\infty$

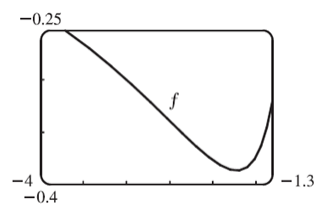
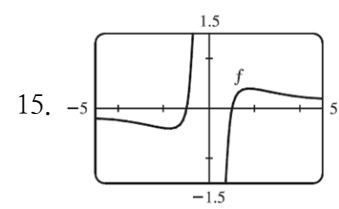
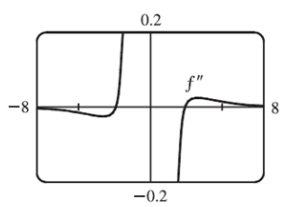
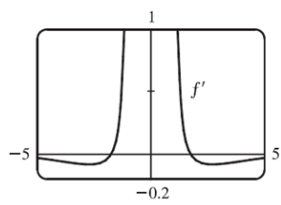
10. -1

11. 1

12. 8

13. 0

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



16. 생략

17. 생략

18. $3\sqrt{3}r^2$

19. $L = C$

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

21. $t^2 + 3\cos t + 2$

22. $\frac{1}{2}x^2 - x^3 + 4x^4 + 2x + 1$

23. $s(t) = t^2 + \cos t + 2$

24.

(a) 생략

(b) 약 $25.44\text{cm} \times 5.96\text{cm}$

(c) $2\sqrt{300}\text{ cm}, 2\sqrt{600}\text{ cm}$