MSE, 미적분학

[연습문제 답안 이용 안내]

Chapter 04 연습문제 답안

《Section 4.1》

1. (a) 극대 : $x = -2$, 극소 : $x = 4$

(b) 극대 : $x = 0$, 극소 : $x = \sqrt{\frac{1}{2}}$

(c) 극대, 극소 없음.

(d) 극소 : $x = 1$

(e) 극소 : $x = \frac{1}{e}$

2. (a) 일차미분 테스트 결과 $x = 2$에서 극소값을 갖는다.

(b) $x = 2$가 극대 또는 극소일 가능성이 있지만, 더 이상 결론을 내릴 수 없다.

(c) 어떤 결론도 내릴 수 없다.

(d) 극값이 존재하지 않는다.

(e) $x = 2$에서 극소값을 갖는다.

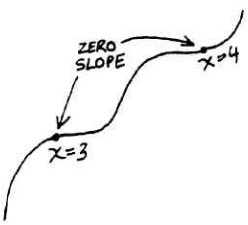
(f) $x = 2$가 극대 또는 극소일 가능성이 있지만, 더 이상 결론을 내릴 수 없다.

(g) $x = 7$가 극대 또는 극소일 가능성이 있지만, 더 이상 결론을 내릴 수 없다.

3. 아니오.

4. x^3은 $x = 0$에서 극값을 갖지 않는다.
x^4는 $x = 0$에서 극소값을 갖는다.
$-x^4$는 $x = 0$에서 극대값을 갖는다.

5.



《Section 4.2》

1. (a) (ⅰ) 최댓값 : ∞, 최솟값 : $-\infty$
   (ii) 최댓값 : -3, 최솟값 : $-\infty$
   (iii) 최댓값 : 0, 최솟값 : -5
   (b) (ⅰ) 최댓값 : ∞, 최솟값 : $-\infty$
   (ii) 최댓값 : ∞, 최솟값 : e
   (iii) 최댓값 : 0, 최솟값 : $-\infty$
   (c) (ⅰ) 최댓값 : ∞, 최솟값 : $-\infty$
   (ii) 최댓값 : $\frac{1}{6}$, 최솟값 : e
   (d) 최댓값 : 79, 최솟값 : $\frac{76}{27}$

2. 최댓값 : $f(3)$, 최솟값 : $f(4)$

3. 최댓값 : ∞, 최솟값 : $\sqrt{2}$

4. 최대 수익을 위한 승객 : 250명
   가장 작은 수익 : 62,500원

5. 최댓값 : 5000, 최솟값 : 0

6. $\overline{EB} = 50$

7. 198일 후

8. 가장 큰 기울기 : -13
   가장 작은 기울기 : -26

9. 3시간 12분 후

10. 가장 가까운 점 : C, D, 가장 먼 점 : B

11. 최대면적 : $\frac{2r}{\sqrt{2}}$

12. 가장 경제적인 속도 : $60km/h$
가장 경제적이지 않은 속도 : $30km/h$

13. 모든 철사를 원 모양을 만드는 데에만 사용한다.

14. $4\sqrt{A}$

15. 125,000원

《Section 4.3》

1. (a) 2 (b) 2 (c) ∞

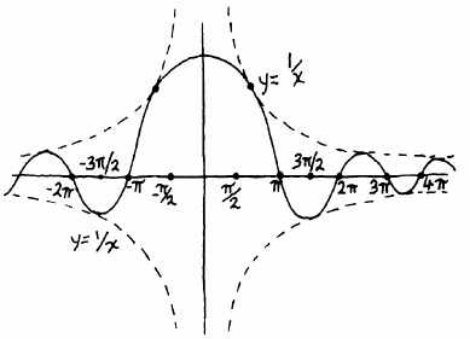
2. (a) ∞ (b) 1 (c) $-\infty$
   (d) 0 (e) 0 (f) 0
   (g) 0 (h) $-\infty$ (i) 0

3. $\lim_{x\to\infty}\frac{(\ln x)^{27}}{x} = 27!$

4. (a) $\lim\frac{3\cos 3x}{2} = \frac{3}{2}$
   (b) $\lim\frac{2\sin x\cos x}{1} = 0$

5. $\lim_{x\to 1}\frac{8x-2}{6x-4} = 3$

6. (a) 동일 (b) e^{5x} (c) 동일

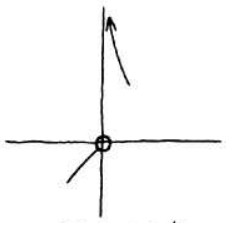
7. 

《Section 4.4》

1. (a) 0 (b) 0 (c) $-\infty$

2. (a) 1 (b) ∞ (c) ∞

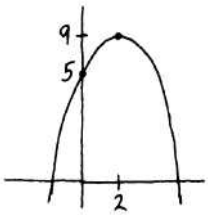
3. (a) $-\infty$ (b) $-\infty$

4. 

5. (a) 0 (b) $-\infty$ (c) ∞
   (d) 1 (e) 0 (f) 1
   (g) ∞ (h) 1 (i) 0
   (j) e^{10}

《Section 4.5》

1.



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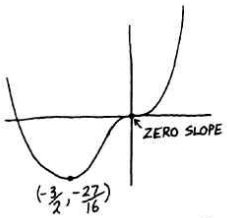
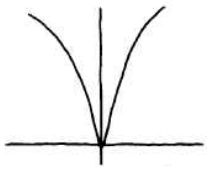


3.

4.



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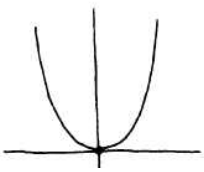

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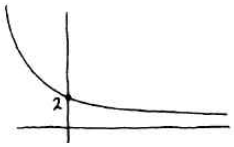

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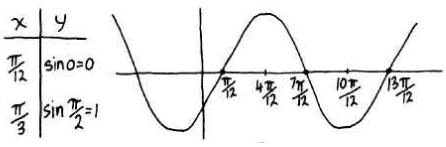

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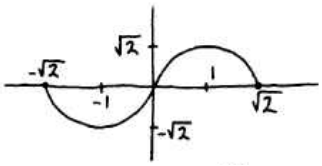

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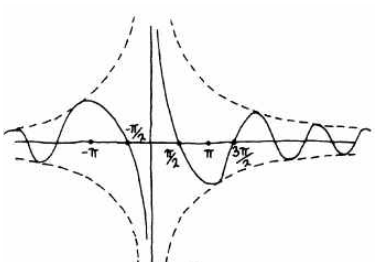

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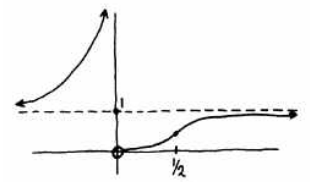

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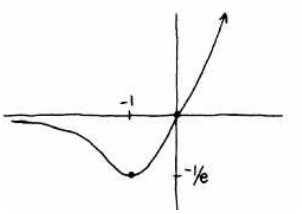

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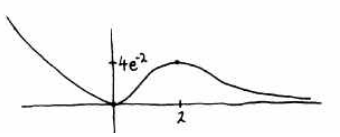

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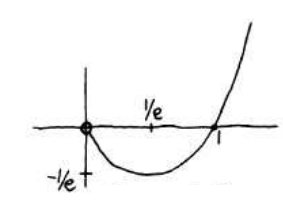

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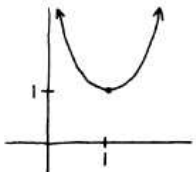

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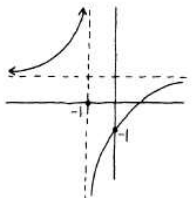

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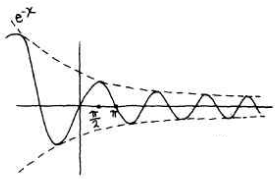

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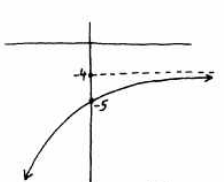

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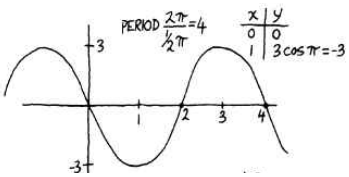

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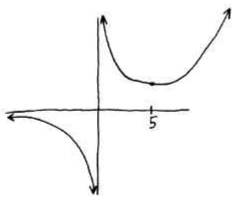

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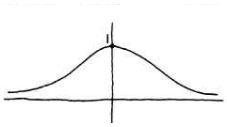

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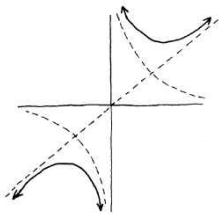

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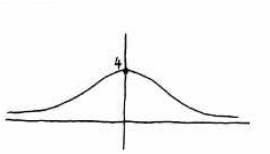
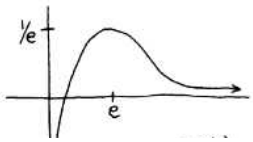
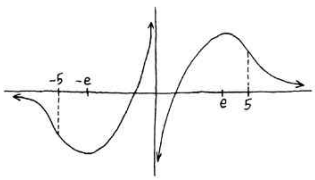


23. (a)



(b)



《Section 4.6》

1. $-\frac{5}{8}\pi$

2. $14cm^2/s$

3. $\frac{25}{\sqrt{10}}m^2/s$

4. $\frac{1}{2}\pi cm^2/\min$

5. $18\sqrt{3}\,cm^2/s$

6. $\frac{338\pi}{5}km/\min$

7. $\frac{12}{\pi}m/\min$

8. $150cm/\sec$

9. (a) $-\frac{40}{9\pi}$ (b) $18\pi cm/\min$ (c) $\frac{1}{\sqrt{\pi}}cm/\min$

10. 20π

11. $4\pi m^2/\sec$

12. $6m^2/s$

13. $r' = -k$

14. $\frac{62}{\sqrt{61}}m/\sec$

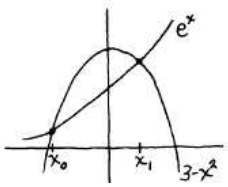
15. $\frac{5}{9} ohms/\min$

《Section 4.7》

1. 6.24

2. 5.572054

3. -1.677



4. (a) 근이 없다. (b) 4.493

《Section 4.8》

1. (a) $\frac{dx}{2\sqrt{x}}$ (b) $-\sin x dx$

   (c) $x^5 \cos x dx + 5x^4 \sin x dx$ (d) $\frac{x cos x dx - \sin x dx}{x^2}$

   (e) $5x^4 \cos x^5 dx$ (f) 0

2. $6x^2 dx$

3. $df = dx$

4. (a) -0.0033 (b) $\frac{1}{320}$

5. (a) $6r\sqrt{3}\, dr$ (b) $dV = \frac{2}{3}\pi r h dr$

《Section 4.9》

1. (a) $\sin y = -\frac{1}{2}x^2 + C$ (b) $y = \pm\sqrt{1/x^2 + D}$

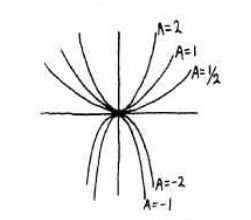
(c) $y = \sqrt[5]{-\frac{5}{3}x^3 + D}$ (d) $y = A\sqrt{2x+3}$

(e) $y = -\ln(\frac{1}{x} + D)$ (f) $y = \pm\sqrt{5x^2 + 6x + D}$

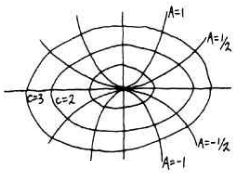
2. (a) $y = 3e^{(x^2-1)/2}$ (b) $y = \sqrt{6x - 5x^2 + 24}$

(c) $y = \ln(\frac{3}{2}x^2 + e^2)$ (d) $y = -\frac{1}{\sqrt[3]{3\sin x - \frac{1}{8}}}$

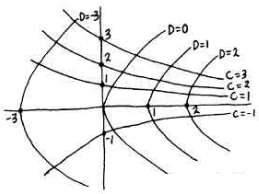
3. (a) $y = Ax^2$ (b) $y = \frac{3}{4}x^2$



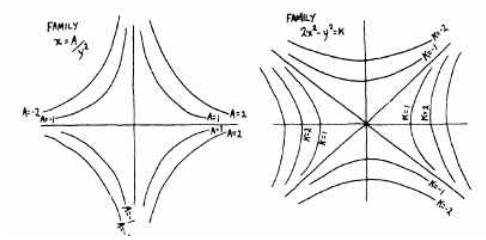
4. (a)



(b)



(c)



5. (a) $y = Ae^{-t/10}$ (b) $y = 75e^{-t/10}$ (c) $10\ln 2$

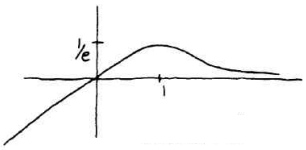
6. $t = 3, m = 2e^{3/2}$

7. $v(t) = \frac{mg}{c}(1 - e^{-ct/m})$

《복습문제》

1. $\dfrac{3k+20}{2k}$

2. (a) 0 (b) $-\infty$

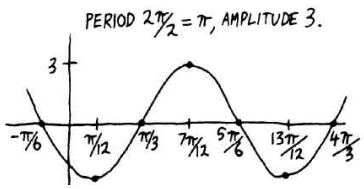
3. 

4. 5

5. $2xe^{2x}dx + e^{2x}dx$

6. (a) 동일 (b) e^{x^2}

7. $54m^2/\sec$

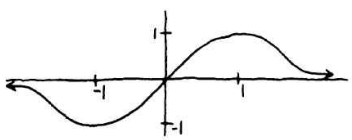
8. (a)


x	y
π/3	3 sin 0=0
7π/12	3 sin π/2=3

(b)


9. (a) $-\infty$ (b) 1

10. $\dfrac{d}{\sqrt{2}}$

11. 

12. (a) 극소 : $x = 0, \pi, \cdots$ 극대 : $x = \frac{\pi}{2}, \frac{3\pi}{2}, \cdots$

(b) 극소 : $x = -2$

13. $y = 2e^{-1/t}$

14. 10×25

15. 최댓값 : 0, 최소값 : $-\ln 2$

16. (a) $f'(x) = 3x^2 - 4x + 3 > 0$ (b) $f(x)$와 x축과의 교차점은 1개이다.

(c) $x = 1.5$ (d) 1.650