

MSE, 미적분학

[연습문제 답안 이용 안내]

- 본 연습문제 답안의 저작권은 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 10 연습문제 답안

《Section 10.1》

1. $(x-4)^2 + (y+3)^2 + (z-5)^2 = 50$
2. $x^2 + y^2 + (z + \frac{1}{2}) = \frac{1}{4}$, 중 심 $(0, 0, -\frac{1}{2})$, 반지름 $\frac{1}{2}$
3. 원 점은 외부에 있다.
4. $(x-3)^2 + (y-5)^2 + (z-6)^2 = 36$

《Section 10.2》

1. (a) $5x + 3y + z = 44$
(b) $x/2 + y/5 + z/7 = 1$
(c) $x = 3$
(d) $z = 5$
(e) $2x + 9y - 6z = 9\pi - 36$

2. 아니오

3. $\frac{20}{\sqrt{29}}$

4. $\frac{4}{\sqrt{10}}$

5. $(x-1)^2 + (y-3)^2 + (z+1)^2 = \frac{4}{6}$

6. $\frac{2}{\sqrt{14}}$

7. $D = \frac{|0+0+0-1|}{\sqrt{(\frac{1}{a})^2 + (\frac{1}{b})^2 + (\frac{1}{c})^2}}, \frac{1}{D^2} = \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}$

8. $16x - 6y + 10z = 12$

《Section 10.3》

1.
 - (a) $x = 1 + t, y = 2 - 2t, z = 3 + 5t$
 - (b) $x = 1 + 3t, y = 4 - 4t, z = 5 + 6t$
 - (c) $x = 2 + t, y = 3, z = 4$
 - (d) $x = 2, y = t, z = 4$
 - (e) $x = 7t, y = -t, z = 16t$
 - (f) $x = 1 + t, y = 5 + t, z = 7 - t$

2. $x = -1 + 14t, y = 3 - 5t$

3.
 - (a) $y = 0$
 - (b) $x = 0, y = 0, z = t$

4. $-29x + 4y + 15z = -61$

5.
 - (a) $\vec{u} = (1, -4, 5), \vec{v} = (2, -1, -6)$
 - (b) $29x + 16y + 7z = 148$
 - (c) $x = 4 + 29t, y = -5 + 16t, z = 16 + 7t$

6. $(0, 11, -1)$

7. $x + 5y - z = 23$

8. $x = 1 + 3t, y = 3 + 2t, z = -2 + 2t$, 한 평면 위에 있지 않음.

9. 직선은 평면 위에 있다.

10.
 - (a) 평행
 - (b) 꼬여있음
 - (c) $(5, 0, -1)$ 에서 교차
 - (d) 일치

11.
 - (a) 답이 없음.
 - (b) 일치

12. $x = 3 + 4t, y = -1 + t, z = -3t$

13. $\vec{u} = (1, 2, 8) \times (1, -1, 2) = (12, 6, -3), \vec{v} = (3, -2, 8), \vec{u} \cdot \vec{v} = 0$ (평행)
직선에 포함된 점 $(12, 4, 0)$ 대입 시 $(36 - 8 + 0 \neq 5)$

14. $P = (-\frac{8}{14}, \frac{5}{14}, \frac{17}{14})$

15. $P = (\frac{14}{9}, \frac{13}{9}, \frac{47}{9}),$
 $\overline{PQ} = \sqrt{(4 - \frac{14}{9})^2 + (-1 - \frac{13}{9})^2 + (4 - \frac{47}{9})^2}$

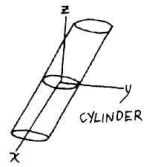
16. $3x - 5y - z = 28, \frac{12}{\sqrt{35}}$

17. (a) $\overrightarrow{AB} = (-1, 4, 2) // \overrightarrow{CD} = (3, -12, 6)$
 \overrightarrow{AB} 와 $\overrightarrow{AC} = (1, 5, 4)$ 는 평행하지 않음

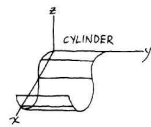
(b) $\overline{AP} = \sqrt{(3 - \frac{95}{21})^2 + (\frac{61}{21})^2 + (2 - \frac{148}{21})^2}$

《Section 10.4》

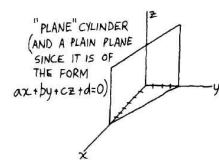
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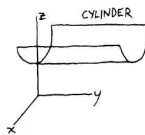
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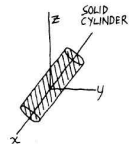
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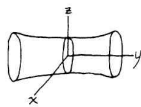
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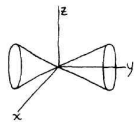
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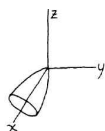
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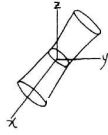
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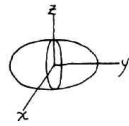
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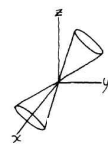
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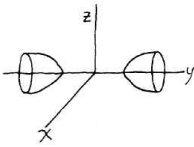
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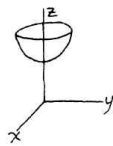
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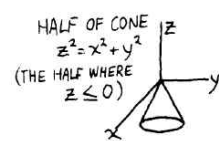
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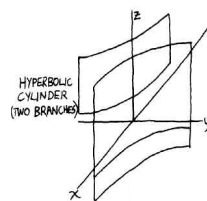
13.



14.



15.



16. 쌍곡포물면, 안장형구조(그리기엔 어려움)

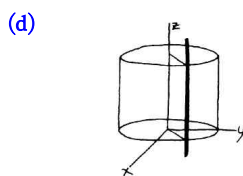
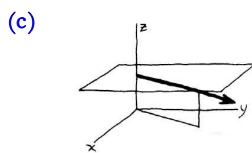
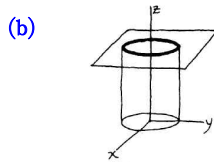
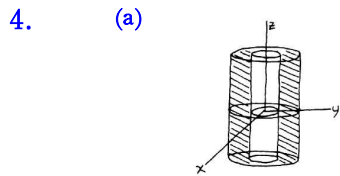
17. $a = b = \frac{1}{2}$

《Section 10.5》

1. (a) $(2, 90, 3)$
(b) $(5, 90, 90)$

2. (a) $(\sqrt{13}, 34, 5)$
(b) $(\sqrt{13}, 214, 5)$

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



5. (a) $r^2 = 4z^2, \rho^2 \sin^2 \phi (\cos^2 \theta + \sin^2 \theta) = 4\rho^2 \cos^2 \phi$, 원뿔 모양
(b) $r^2 + z^2 = 10, \rho = \sqrt{10}$, 원통형
6. (a) $z = 0, r = 0$
(b) $\phi = 90, \phi = 0$ 또는 180

7. (a) $\sqrt{x^2 + y^2 + z^2}$ (직교), $\sqrt{r^2 + x^2}$ (원기둥), ρ (구면)
- (b) $\sqrt{x^2 + y^2}$ (직교), r (원기둥), $\rho \sin \theta$ (구면)

《복습문제》

1. (a) $x = 2 - t, y = 3 + t, z = -3 + 3t$
 (b) $x = 2 + 4t, y = 3 + 7t, z = -3 - t$
 (c) $-x + y + 3z = -8$
 (d) $4x + 7y - z = 32$

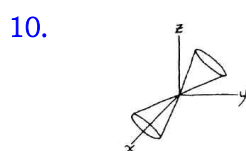
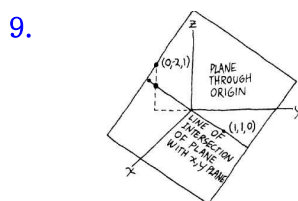
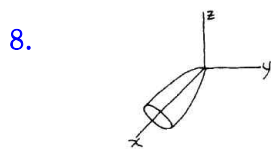
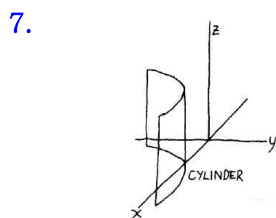
2. $x = -1, y = 1, z = 3$

3. $x = 0, y = 5, z = -3$

4. $x = 2 + 5t, y = 1 + 19t, z = 4t$

5. $x = 9 - 3t, y = 8 - 4t, z = 7 - 4t$

6. $\frac{8}{\sqrt{65}}$



11. $-x + y + \sqrt{3}z = 5$

12. $x = 0, y = 2, z = 5$
 $\rho = \sqrt{29}, \theta = 90, \phi = \tan^{-1} \frac{2}{5}$

13. (a) $x^2 + y^2 = 4$
(b) $r = 2$
(c) $\rho = 2\csc\phi$

14. $\vec{v} = (1, 1, -2), \vec{u} \times \vec{v} = (3, 9, 6)$