

연습문제 해답

게시 일자 : 2018-04-19

7장

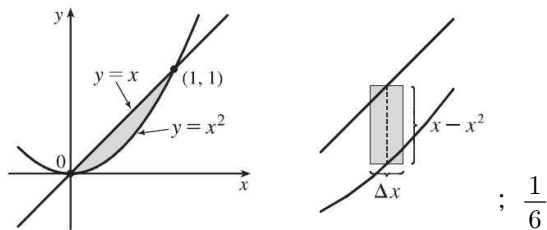
적분의 응용

7.1 곡선 사이의 넓이

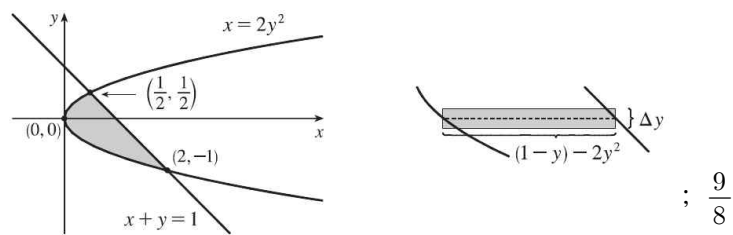
01. $\frac{32}{3}$

02. $e - \frac{1}{e} + \frac{10}{3}$

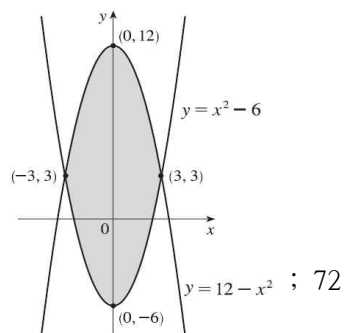
03.



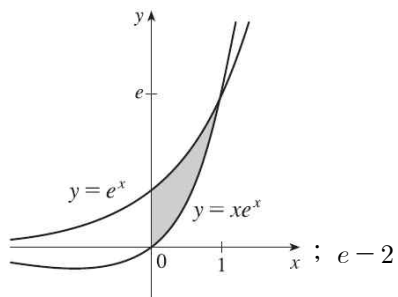
04.



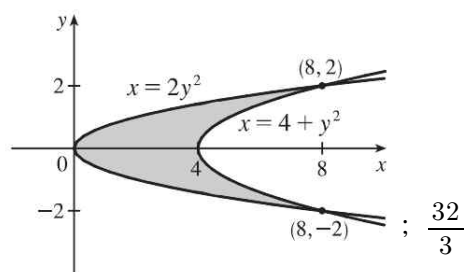
05.



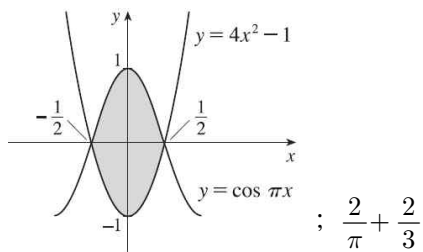
06.



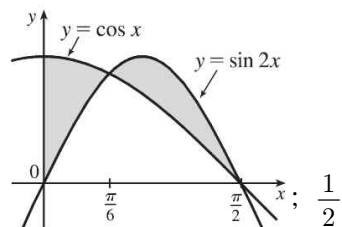
07.



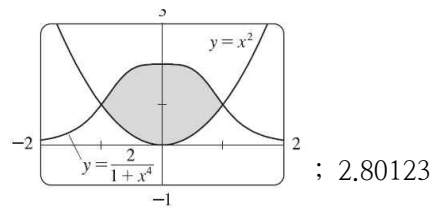
08.



09.



10.



11. 8868; 10년 동안 인구의 증가

12. $r\sqrt{R^2-r^2} + \frac{\pi}{2}r^2 - R^2 \arcsin\left(\frac{r}{R}\right)$

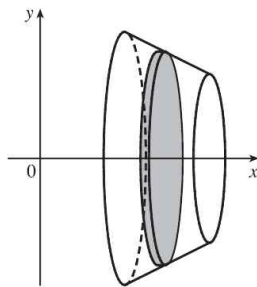
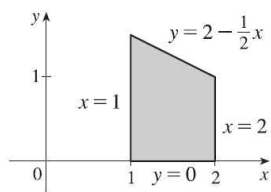
13. $4^{2/3}$

14. $f(t) = 3t^2$

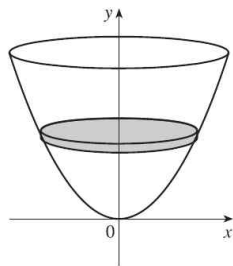
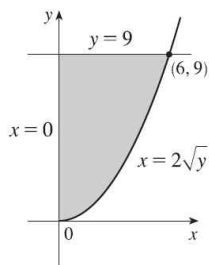
15. $0 < m < 1$; $m - \ln m - 1$

7.2 부피

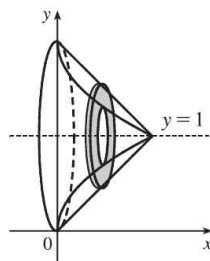
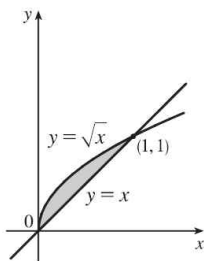
01. $\frac{19}{12}\pi$



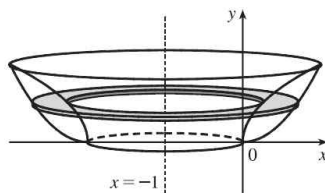
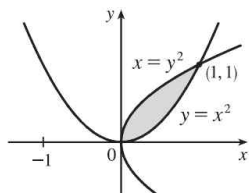
02. 162π



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



04. $\frac{29}{30}\pi$



05. $\frac{108}{5}\pi$

06. $\frac{13}{30}\pi$

07.

(a) $2\pi \int_0^1 e^{-2x^2} dx \approx 3.75825$

(b) $2\pi \int_0^1 (e^{-2x^2} + 2e^{-x^2}) dx \approx 13.14312$

08.

(a) $2\pi \int_0^2 8\sqrt{1-x^2/4} dx \approx 78.95684$

(b) $2\pi \int_0^1 8\sqrt{4-4y^2} dy \approx 78.95684$

09. $\frac{11}{8}\pi^2$

10.

(a) 영역 $0 \leq x \leq \frac{\pi}{2}$, $0 \leq y \leq \cos x$ 를 x 축에 대하여 회전시켜 얻은 입체

(b) 영역 $0 \leq y \leq 1$, $y^4 \leq x \leq y^2$ 를 y 축에 대하여 회전시켜 얻은 입체

11. $\frac{1}{3}\pi r^2 h$

12. $\pi h^2 \left(r - \frac{h}{3} \right)$

13. $\frac{2}{3}b^2 h$

14. 24

15. $\frac{\sqrt{3}}{12}$

16.

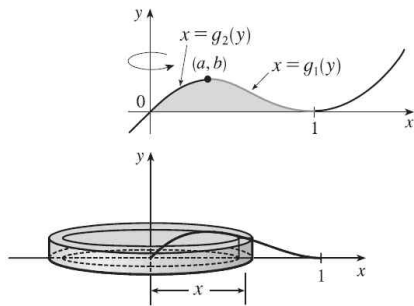
(a) $8\pi R \int_0^r \sqrt{r^2 - y^2} \, dy$

(b) $2\pi^2 r^2 R$

17. $\frac{5}{12}\pi r^3$

7.3 원통껍질에 의한 부피

01.



원둘레 $= 2\pi x$, 높이 $= x(x-1)^2$; $V = \frac{\pi}{15}$

02. $\frac{6}{7}\pi$

03. $\pi(1 - 1/e)$

04. 4π

05. $\frac{16}{3}\pi$

06. $\frac{8}{3}\pi$

07. $\frac{5}{14}\pi$

08.

(a) $2\pi \int_0^2 x^2 e^{-x} dx$

(b) 4.06300

09.

(a) $4\pi \int_{-\pi/2}^{\pi/2} (\pi - x) \cos^4 x dx$

(b) 46.50942

10. (i) $x = 1 - y^2, x = 0, y = 0$ 또는 (ii) $x = y^2, x = 1, y = 0$ 을 직선 $y = 3$ 에 대해 회전시켜 얻은 입체

11. $4\sqrt{3}\pi$

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

13. $2\pi^2 Rr^2$

14. $\frac{\pi r^2 h}{3}$

15. 생략

7.4 호의 길이

01. $3\sqrt{10}$

02. 3.8202

03. $\frac{2}{243}(82\sqrt{82}-1)$

04. $\frac{59}{24}$

05. $\ln(\sqrt{2}+1)$

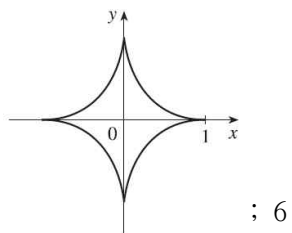
06. $\frac{3}{4}+\frac{1}{2}\ln 2$

07. 10.0556

08. 15.498085; 15.374568

09. $\ln 3 - \frac{1}{2}$

10.



11. $2\sqrt{2}(\sqrt{1+x}-1)$

12. 209.1m

7.5 회전체의 곡면 넓이

01.

(a) (i) $\int_0^{\pi/3} 2\pi \tan x \sqrt{1 + \sec^4 x} \, dx$

(ii) $\int_0^{\pi/3} 2\pi x \sqrt{1 + \sec^4 x} \, dx$

(b) (i) 10.5017

(ii) 7.9353

02. $\frac{\pi}{27}(145\sqrt{145} - 1)$

03. $2\sqrt{1+\pi^2} + \frac{2}{\pi} \ln(\pi + \sqrt{1+\pi^2})$

04. $\frac{\pi}{27}(145\sqrt{145} - 10\sqrt{10})$

05. πa^2

06.

(a) $\frac{\pi a^2}{3}$

(b) $\frac{56\pi\sqrt{3}a^2}{45}$

07.

(a) $2\pi \left[b^2 + \frac{a^2 b \sin^{-1} \frac{\sqrt{a^2 - b^2}}{a}}{\sqrt{a^2 - b^2}} \right]$

(b) $2\pi a^2 + \frac{2\pi ab^2}{\sqrt{a^2 - b^2}} \ln \frac{\sqrt{a^2 - b^2} + a}{b}$

08. $4\pi^2 Rr$

09. $\int_a^b 2\pi [c - f(x)] \sqrt{1 + [f'(x)]^2} \, dx$

10. $4\pi^2 r^2$

7장 복습문제

연습문제

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

02. $\frac{7}{12}$

03. $\frac{64}{15}\pi$

04. $\frac{1656}{5}\pi$

05. $\frac{4}{3}\pi(2ah + h^2)^{3/2}$

06. $\int_{-\pi/3}^{\pi/3} 2\pi\left(\frac{\pi}{2} - x\right)\left(\cos^2 x - \frac{1}{4}\right)dx$

07.

(a) $\frac{2}{15}\pi$

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

(c) $\frac{8}{15}\pi$

08.

(a) 0.38

(b) 0.87

09. 영역 $0 \leq x \leq \frac{\pi}{2}$, $0 \leq y \leq \cos x$ 를 y 축에 대하여 회전시켜 얻은 입체

10. 영역 $0 \leq x \leq \pi$, $0 \leq y \leq 2 - \sin x$ 를 x 축에 대하여 회전시켜 얻은 입체

11. 36

12. $\frac{125\sqrt{3}}{3}m^3$

13.

(a) $\frac{21}{16}$

(b) $\frac{41}{10}\pi$

14. 3.820188

15. $\frac{124}{5}$

16. $\frac{4088}{9}\pi$

17.

(a) $\frac{8000\pi}{3} \approx 8378 \text{ ft-lb}$

(b) 2.1ft

18. $2\pi^2$