H10

A

[Ex 6.3]

Find the lengths of the curves in Exercises.

1. $x = 1 - t, \quad y = 2 + 3t, \quad -2/3 \le t \le 1$

2. $x = \cos t, \quad y = t + \sin t, \quad 0 \le t \le \pi$

3. $x = t^3, \quad y = 3t^2/2, \quad 0 \le t \le \sqrt{3}$

B

[Ex 6.5]

9. Find the lateral (side) surface area of the cone generated by revolving the line segment $y = x/2, 0 \le x \le 4$, about the x-axis. Check your answer with the geometry formula

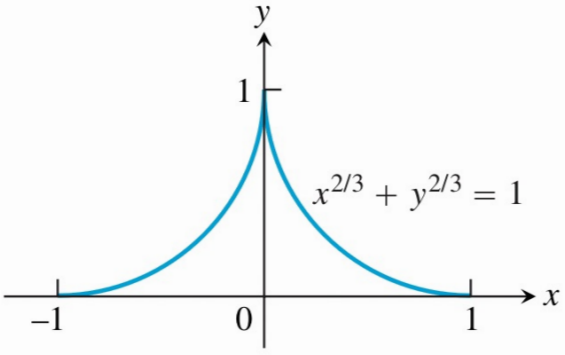
$$\text{Lateral surface area} = \frac{1}{2} \times \text{base circumference} \times \text{slant height}.$$

11. Find the surface area of the cone frustum generated by revolving the line segment $y = (x/2) + (1/2), 1 \le x \le 3$, about the x-axis. Check your result with the geometry formula

$$\text{Frustum surface area} = \pi(r_1 + r_2) \times \text{slant height}.$$

C

26. The surface of an astroid Find the area of the surface generated by revolving about the x-axis the portion of the astroid $x^{2/3} + y^{2/3} = 1$ shown here. (*Hint:* Revolve the first-quadrant portion $y = (1 - x^{2/3})^{3/2}, 0 \le x \le 1$, about the x-axis and double your result.)



D

[Ex 7.1]

Each of Exercises below gives a formula for a function $y = f(x)$. In each case, find $f^{-1}(x)$ and identify the domain and range of f^{-1}. As a check, show that $f(f^{-1}(x)) = f^{-1}(f(x)) = x$.

19. $f(x) = x^5$

20. $f(x) = x^4, \quad x \geq 0$

23. $f(x) = 1/x^2, \quad x > 0$

24. $f(x) = 1/x^3, \quad x \neq 0$

E

[Ex 7.2]

Evaluate the integrals in Exercises.

39. $\displaystyle\int \frac{2y\,dy}{y^2 - 25}$

44. $\displaystyle\int_2^4 \frac{dx}{x \ln x}$

45. $\displaystyle\int_2^4 \frac{dx}{x(\ln x)^2}$

F

[Ex 7.3]

Evaluate the integrals in Exercises.

42. $\displaystyle\int (2e^x - 3e^{-2x})\,dx$

49. $\displaystyle\int \frac{e^{\sqrt{r}}}{\sqrt{r}}\,dr$

55. $\displaystyle\int_0^{\pi/4} (1 + e^{\tan\theta}) \sec^2\theta\,d\theta$

G

68. Where does the periodic function $f(x) = 2e^{\sin(x/2)}$ take on its extreme values and what are these values?