

## 14.4 EXERCISES

 PRACTICE

In Exercises 1–32, evaluate each definite integral.

1.  $\int_{-1}^0 5x^2 dx$

2.  $\int_1^4 \frac{1}{x} dx$

3.  $\int_0^3 (1 + e^x) dx$

4.  $\int_0^2 6e^x dx$

5.  $\int_3^5 \frac{1}{x-2} dx$

6.  $\int_1^9 \sqrt{x} dx$

7.  $\int_{-4}^{-2} \frac{1}{x^2} dx$

8.  $\int_2^4 (7x + 2) dx$

9.  $\int_{-1}^3 (4x + 1) dx$

10.  $\int_{-2}^1 \frac{4}{x+3} dx$

11.  $\int_{-1}^3 e^{x+1} dx$

12.  $\int_2^3 (x^2 + 2x - 4) dx$

13.  $\int_2^4 x(x^2 - 3) dx$

14.  $\int_1^8 \left(1 + \frac{1}{\sqrt[3]{x}}\right) dx$

15.  $\int_0^3 \frac{1}{3x+1} dx$

16.  $\int_1^3 2e^{-1.5x} dx$

17.  $\int_3^5 \frac{1}{(3x+1)^2} dx$

18.  $\int_{-1}^0 \sqrt{3x+4} dx$

19.  $\int_2^3 (3-2x)^4 dx$

20.  $\int_0^2 \frac{x}{\sqrt[3]{x^2+4}} dx$

21.  $\int_2^6 \frac{3x}{x^2-3} dx$

22.  $\int_3^5 \frac{x+2}{x^2+4x+3} dx$

23.  $\int_0^1 e^x (e^x + 1) dx$

24.  $\int_0^5 xe^{-0.24x^2} dx$

25.  $\int_1^3 xe^{x^2-1} dx$

26.  $\int_1^2 (x-1)(2x^2-4x+1)^2 dx$

27.  $\int_6^7 \frac{x-3}{\sqrt{x^2-6x+4}} dx$

28.  $\int_1^8 \left(2x^{\frac{2}{3}} - x^{-2}\right) dx$

29.  $\int_0^1 \frac{e^x}{e^x+1} dx$

30.  $\int_1^4 \frac{\ln x}{x} dx$

31.  $\int_1^3 \frac{1+\ln x}{x} dx$

32.  $\int_2^4 \frac{1}{x^2} e^{\frac{1}{x}} dx$

For Exercises 33–38, find the average value of the function on the given interval.

33.  $f(x) = x^2 + 6$ ;  $[1, 4]$

34.  $f(x) = 4x^2 - 3x + 1$ ;  $[-1, 3]$

35.  $f(x) = \sqrt{x+1}$ ;  $[3, 8]$

36.  $f(x) = \sqrt[3]{2x+1}$ ;  $[0, 13]$

37.  $f(x) = 2e^{-0.25x}$ ;  $[0, 4]$

38.  $f(x) = 1 + e^{-0.4x}$ ;  $[0, 5]$

 APPLICATIONS

- 39. Pollution:** The level of pollution in San Felipe Bay, due to an oil spill, is estimated to be  $f(t) = \frac{1800t}{\sqrt{t^2 + 11}}$  parts per million, where  $t$  is the time in days since the spill occurred. Find the average level of pollution during the first 5 days after the spill occurred.
- 40. Bacterial population:** It is estimated that the number of bacteria present in a culture  $t$  hours after bacteria are introduced to the culture is given by  $N(t) = \frac{8000}{\sqrt{8 - 0.5t}}$ . Find the average number of bacteria present during the first 8 hours.
- 41. Average production:** The daily production level for a product is given by  $N(t) = 240 - 240e^{-0.2t}$  units, where  $t$  is the time in hours after production begins. Find the average production during the first 4 hours.
- 42. Average marginal profit:** The marginal profit from the production and the sale of  $x$  barbecue grills is given by  $P'(x) = 52 - 0.8x$  dollars per grill. Find the average marginal profit for the first 40 grills produced and sold.