6.4 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. $\int_{0}^{3} \left(1+e^x\right)dx$
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. $\int_{2}^{3} \left(x^2+2x-4\right)dx$
13. $\int_{2}^{4} x\left(x^2-3\right)dx$
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. $\int_{0}^{1} e^x\left(e^x+1\right)dx$
24. $\int_{0}^{5} xe^{-0.24x^2}\,dx$
25. $\int_{1}^{3} xe^{x^2-1}\,dx$
26. $\int_{1}^{2} (x-1)\left(2x^2-4x+1\right)^2\,dx$
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 $f(t) = \dfrac{1800t}{\sqrt{t^2 + 11}}$ 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 $N(t) = \dfrac{8000}{\sqrt{8 - 0.5t}}$. 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.