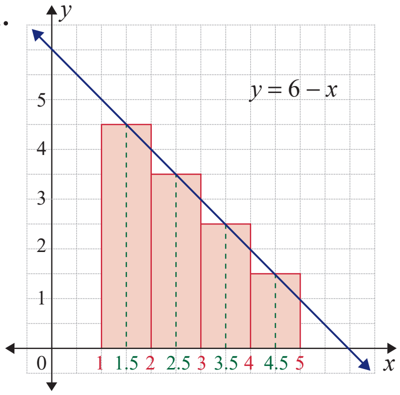
6.3 EXERCISES

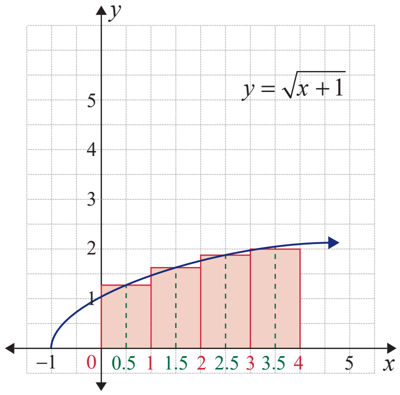
PRACTICE

In Exercises 1–2, find the area of the shaded region.

1.



2.



In Exercises 3–7, find the Riemann sum S_n for the given function, interval, and value of n.

3. $f(x) = x^2$; $[a, b] = [0, 4]$; $n = 4$; $c_1 = 0.5, c_2 = 1.5, c_3 = 2.5, c_4 = 3.5$

4. $f(x) = 9 - x^2$; $[a, b] = [-3, 2]$; $n = 5$; $c_1 = -2.5, c_2 = -1.5, c_3 = -0.5, c_4 = 0.5, c_5 = 1.5$

5. $f(x) = \sqrt{2 - x}$; $[a, b] = [-2, 2]$; $n = 4$; Use the midpoint of each subinterval for the value of each c_k.

6. $f(x) = \dfrac{1}{x + 2}$; $[a, b] = [-1, 3]$; $n = 4$; Use the midpoint of each subinterval for the value of each c_k.

7. $f(x) = 2 + x^2$; $[a, b] = [0, 4]$; $n = 4$; Use the midpoint of each subinterval for the value of each c_k.

WRITING & THINKING

Use four rectangles to estimate the area between the graph of the given function and the x-axis on the given interval. Construct three estimates for the function: the first using the left endpoints of the subintervals as the sample points, the second using the right endpoints of the subintervals, and the third using the midpoints of the subintervals. Can you tell which are guaranteed to be underestimates or overestimates? (**Hint:** Consider the increasing/decreasing and concavity features of the graph. It is helpful to make a sketch.)

8. $f(x) = \sqrt{x}$ on $[0, 4]$

9. $f(x) = \dfrac{x^3}{16}$ on $[0, 4]$

10. $f(x) = \dfrac{1}{x}$ on $[1, 5]$

11. $f(x) = \sqrt{4 - x^2}$ on $[-2, 2]$

12. $f(x) = e^{2-x}$ on $[0, 2]$