

$$\text{c. } m = \frac{\Delta y}{\Delta x} = \frac{f(a+h) - f(a)}{h} = \frac{-2ah - h^2}{h} = \frac{h(-2a-h)}{h} = -2a-h$$

The difference quotient is the slope of the line containing the two points in part b.

1.2 EXERCISES

PRACTICE

- Let $f(x) = \frac{2x+1}{x^2}$. Find **a.** $f(1)$, **b.** $f(3)$, **c.** $f(3) - f(1)$, **d.** $\frac{f(3) - f(1)}{3-1}$, and **e.** interpret the meaning in parts a.–d.
- Let $f(x) = \frac{x^2 - 4}{x+3}$. Find **a.** $f(0)$, **b.** $f(2)$, **c.** $f(2) - f(0)$, **d.** $\frac{f(2) - f(0)}{2-0}$, and **e.** interpret the result of part c.

In Exercises 3–23, let $f(x) = \frac{1}{x}$, $g(x) = x^2 - 2x$, and $h(x) = \sqrt{x}$. Find and simplify each of the following expressions.

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|----------------------|---------------------------|--------------------------------------|
| 3. $f(x) + g(x)$ | 4. $f(x) - g(x)$ | 5. $f(x) \cdot h(x)$ |
| 6. $g(x) \cdot h(x)$ | 7. $\frac{h(x)}{f(x)}$ | 8. $\frac{g(x)}{h(x)}$ |
| 9. $f(g(1))$ | 10. $g(f(2))$ | 11. $h(g(3))$ |
| 12. $g(h(2))$ | 13. $f(h(3))$ | 14. $h(f(4))$ |
| 15. $g(t+1)$ | 16. $f(t-3)$, $t \neq 3$ | 17. $h(2t-1)$, $t \geq \frac{1}{2}$ |
| 18. $f(g(t))$ | 19. $g(f(x))$ | 20. $f(h(x))$ |
| 21. $g(h(x))$ | 22. $h(g(u))$ | 23. $h(f(u))$ |

In Exercises 24–29, identify two functions $h(x)$ and $g(x)$ so that the given function $f(x)$ can be expressed as $f(x) = g(h(x))$. Answers may vary.

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|-------------------------------|--|
| 24. $f(x) = -\frac{5}{x+4}$ | 25. $f(x) = \sqrt[3]{1-6x^2}$ |
| 26. $f(x) = 2-7x $ | 27. $f(x) = (x^4 + 2)^{\frac{1}{3}}$ |
| 28. $f(x) = (2x^2 + 3x)^{-3}$ | 29. $f(x) = \frac{\sqrt{x-3}}{x^2 - 6x + 9}$ |