

## 3.2 Exercises

In Exercises 1–30, find the derivative of each function.

1.  $f(x) = 2x(x^2 + 1)$

2.  $f(x) = 3x^2(x - 1)$

3.  $f(t) = (t - 1)(2t + 1)$

4.  $f(x) = (2x + 3)(3x - 4)$

5.  $f(x) = (3x + 1)(x^2 - 2)$

6.  $f(x) = (x + 1)(2x^2 - 3x + 1)$

7.  $f(x) = (x^3 - 1)(x + 1)$

8.  $f(x) = (x^3 - 12x)(3x^2 + 2x)$

9.  $f(w) = (w^3 - w^2 + w - 1)(w^2 + 2)$

10.  $f(x) = \frac{1}{5}x^5 + (x^2 + 1)(x^2 - x - 1) + 28$

11.  $f(x) = (5x^2 + 1)(2\sqrt{x} - 1)$

12.  $f(t) = (1 + \sqrt{t})(2t^2 - 3)$

13.  $f(x) = (x^2 - 5x + 2)\left(x - \frac{2}{x}\right)$

14.  $f(x) = (x^3 + 2x + 1)\left(2 + \frac{1}{x^2}\right)$

15.  $f(x) = \frac{1}{x - 2}$

16.  $g(x) = \frac{3}{2x + 4} + 2x^2$

17.  $f(x) = \frac{2x - 1}{2x + 1}$

18.  $f(t) = \frac{1 - 2t}{1 + 3t}$

19.  $f(x) = \frac{1}{x^2 + x + 2}$

20.  $f(u) = \frac{u}{u^2 + 1}$

21.  $f(s) = \frac{s^2 - 4}{s + 1}$

22.  $f(x) = \frac{x^3 - 2}{x^2 + 1}$

23.  $f(x) = \frac{\sqrt{x} + 1}{x^2 + 1}$

24.  $f(x) = \frac{x}{\sqrt{x} + 2}$

25.  $f(x) = \frac{x^2 + 2}{x^2 + x + 1}$

26.  $f(x) = \frac{x + 1}{2x^2 + 2x + 3}$

27.  $f(x) = \frac{(x + 1)(x^2 + 1)}{x - 2}$

28.  $f(x) = (3x^2 - 1)\left(x^2 - \frac{1}{x}\right)$

29.  $f(x) = \frac{x}{x^2 - 4} - \frac{x - 1}{x^2 + 4}$

30.  $f(x) = \frac{x + \sqrt{3x}}{3x - 1}$

In Exercises 31–34, suppose  $f$  and  $g$  are functions that are differentiable at  $x = 1$  and that  $f(1) = 2$ ,  $f'(1) = -1$ ,  $g(1) = -2$ , and  $g'(1) = 3$ . Find the value of  $h'(1)$ .

31.  $h(x) = f(x)g(x)$

32.  $h(x) = (x^2 + 1)g(x)$

33.  $h(x) = \frac{xf(x)}{x + g(x)}$

34.  $h(x) = \frac{f(x)g(x)}{f(x) - g(x)}$