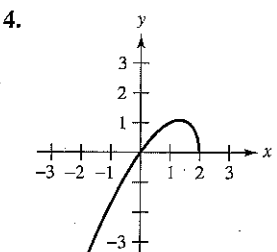
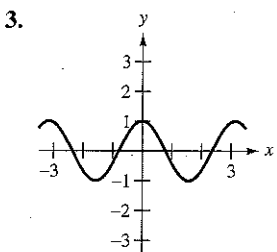
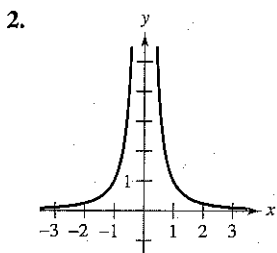
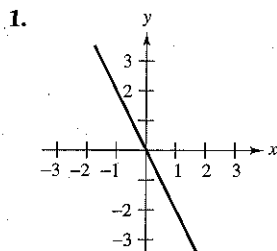


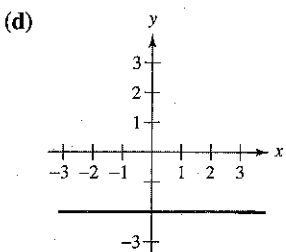
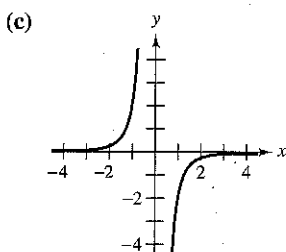
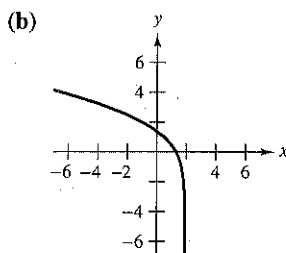
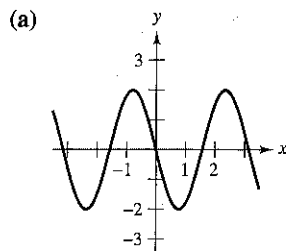
**EXERCISES FOR SECTION 3.6**

In Exercises 1–4, match the graph of  $f$  in the left column with that of its derivative in the right column.

*Graph of  $f$*



*Graph of  $f'$*



5. **Graphical Reasoning** The graph of  $f$  is given in the figure.
- For which values of  $x$  is  $f'(x)$  zero? Positive? Negative?
  - For which values of  $x$  is  $f''(x)$  zero? Positive? Negative?
  - On what interval is  $f'$  an increasing function?
  - For which value of  $x$  is  $f'(x)$  minimum? For this value of  $x$ , how does the rate of change of  $f$  compare with the rate of change of  $f$  for other values of  $x$ ? Explain.

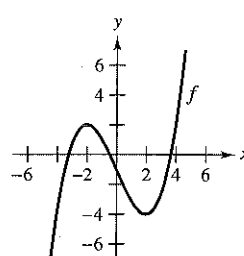


Figure for 5

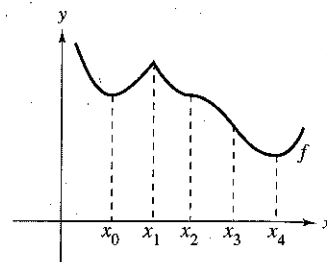


Figure for 6

6. **Graphical Reasoning** Identify the real numbers  $x_0, x_1, x_2, x_3,$  and  $x_4$  in the figure such that each of the following is true.
- $f'(x) = 0$
  - $f''(x) = 0$
  - $f'(x)$  does not exist.
  - $f$  has a relative maximum.
  - $f$  has a point of inflection.

**In Exercises 7–38, analyze and sketch a graph of the function. Label any intercepts, relative extrema, points of inflection, and asymptotes. Use a graphing utility to verify your results.**

7.  $y = \frac{x^2}{x^2 + 3}$

8.  $y = \frac{x}{x^2 + 1}$

9.  $y = \frac{1}{x-2} - 3$

10.  $y = \frac{x^2 + 1}{x^2 - 9}$

11.  $y = \frac{2x}{x^2 - 1}$

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

13.  $g(x) = x + \frac{4}{x^2 + 1}$

14.  $f(x) = x + \frac{32}{x^2}$

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

16.  $f(x) = \frac{x^3}{x^2 - 4}$

17.  $y = \frac{x^2 - 6x + 12}{x - 4}$

18.  $y = \frac{2x^2 - 5x + 5}{x - 2}$

19.  $y = x\sqrt{4-x}$

20.  $g(x) = x\sqrt{9-x}$

21.  $h(x) = x\sqrt{9-x^2}$

22.  $y = x\sqrt{16-x^2}$

23.  $y = 3x^{2/3} - 2x$

24.  $y = 3(x-1)^{2/3} - (x-1)^2$

25.  $y = x^3 - 3x^2 + 3$

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

27.  $y = 2 - x - x^3$

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

29.  $f(x) = 3x^3 - 9x + 1$

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

31.  $y = 3x^4 + 4x^3$

32.  $y = 3x^4 - 6x^2 + \frac{5}{3}$

33.  $f(x) = x^4 - 4x^3 + 16x$

34.  $f(x) = x^4 - 8x^3 + 18x^2 - 16x + 5$

35.  $y = x^5 - 5x$

36.  $y = (x-1)^5$

37.  $y = |2x - 3|$

38.  $y = |x^2 - 6x + 5|$