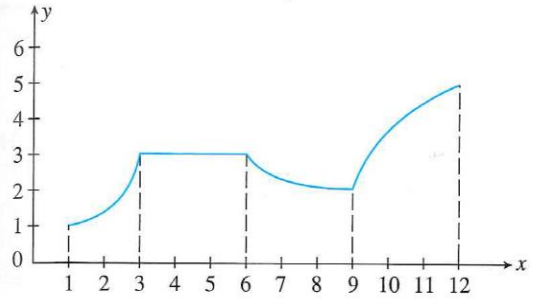
a. Determine the interval where f is decreasing. This corresponds to the time period when the fleet damage rate is dropping as problems are found and corrected during the initial "shakedown" period.
b. Determine the interval where f is constant. After the initial shakedown period, planes have few structural problems, and this is reflected by the fact that the function is constant on this interval.
c. Determine the interval where f is increasing. Beyond the time period mentioned in part (b), the function is increasing—reflecting an increase in structural defects due mainly to metal fatigue.

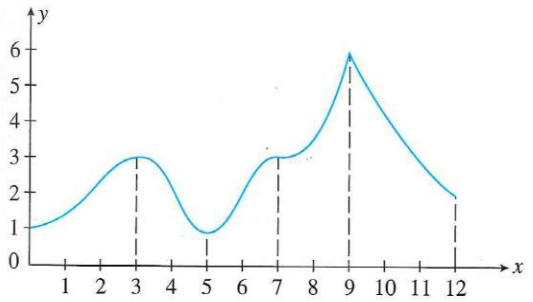
12. Refer to the following figure:



What is the sign of the following?

a. $f'(2)$ **b.** $f'(x)$ in the interval $(1, 3)$
c. $f'(4)$ **d.** $f'(x)$ in the interval $(3, 6)$
e. $f'(7)$ **f.** $f'(x)$ in the interval $(6, 9)$
g. $f'(x)$ in the interval $(9, 12)$

13. Refer to the following figure:



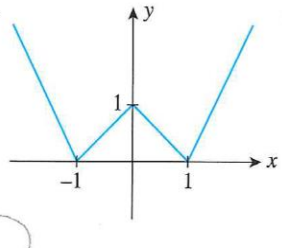
a. What are the critical numbers of f? Give reasons for your answers.
b. Draw the sign diagram for f'.
c. Find the relative extrema of f.

In Exercises 14–37, find the interval(s) where the function is increasing and the interval(s) where it is decreasing.

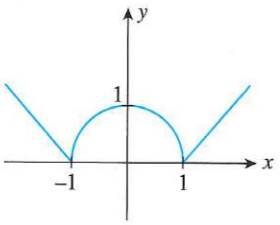
14. $f(x) = 4 - 5x$ **15.** $f(x) = 3x + 5$
16. $f(x) = x^2 - 3x$ **17.** $f(x) = 2x^2 + x + 1$
18. $f(x) = x^3 - 3x^2$ **19.** $g(x) = x - x^3$
20. $f(x) = x^3 - 3x + 4$ **21.** $g(x) = x^3 + 3x^2 + 1$
22. $f(x) = \frac{1}{3}x^3 - 3x^2 + 9x + 20$
23. $f(x) = \frac{2}{3}x^3 - 2x^2 - 6x - 2$
24. $g(x) = x^4 - 2x^2 + 4$ **25.** $h(x) = x^4 - 4x^3 + 10$
26. $f(x) = \frac{1}{x - 2}$ **27.** $h(x) = \frac{1}{2x + 3}$
28. $h(t) = \frac{t}{t - 1}$ **29.** $g(t) = \frac{2t}{t^2 + 1}$
30. $f(x) = x^{3/5}$ **31.** $f(x) = x^{2/3} + 5$
32. $f(x) = \sqrt{x + 1}$ **33.** $f(x) = (x - 5)^{2/3}$
34. $f(x) = \sqrt{16 - x^2}$ **35.** $g(x) = x\sqrt{x + 1}$
36. $f(x) = \frac{1 - x^2}{x}$ **37.** $h(x) = \frac{x^2}{x - 1}$

In Exercises 38–45, you are given the graph of a function f. Determine the relative maxima and relative minima, if any.

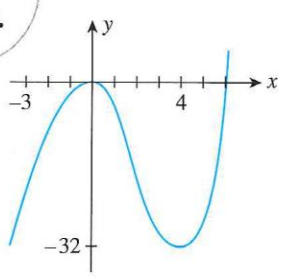
38.



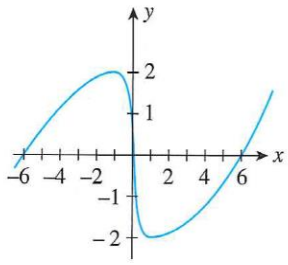
39.



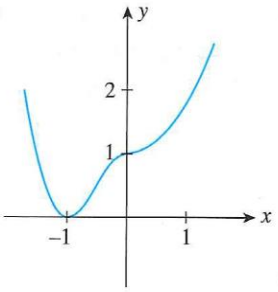
40.



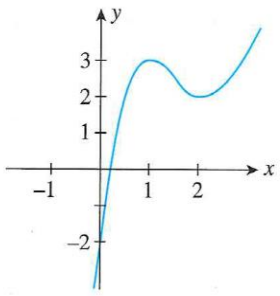
41.



42.



43.



44.