

In Exercises 11–16, find any critical numbers of the function.

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

12. $g(x) = x^2(x^2 - 4)$

13. $g(t) = t\sqrt{4 - t}$, $t < 3$

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

15. $h(x) = \sin^2 x + \cos x$
 $0 < x < 2\pi$

16. $f(\theta) = 2 \sec \theta + \tan \theta$
 $0 < \theta < 2\pi$

In Exercises 17–32, locate the absolute extrema of the function on the closed interval.

17. $f(x) = 2(3 - x)$, $[-1, 2]$

18. $f(x) = \frac{2x + 5}{3}$, $[0, 5]$

19. $f(x) = -x^2 + 3x$, $[0, 3]$

20. $f(x) = x^2 + 2x - 4$, $[-1, 1]$

21. $f(x) = x^3 - \frac{3}{2}x^2$, $[-1, 2]$

22. $f(x) = x^3 - 12x$, $[0, 4]$

23. $y = 3x^{2/3} - 2x$, $[-1, 1]$

24. $g(x) = \sqrt[3]{x}$, $[-1, 1]$

25. $g(t) = \frac{t^2}{t^2 + 3}$, $[-1, 1]$

26. $y = 3 - |t - 3|$, $[-1, 5]$

27. $h(s) = \frac{1}{s - 2}$, $[0, 1]$

28. $h(t) = \frac{t}{t - 2}$, $[3, 5]$

29. $f(x) = \cos \pi x$, $\left[0, \frac{1}{6}\right]$

30. $g(x) = \sec x$, $\left[-\frac{\pi}{6}, \frac{\pi}{3}\right]$

31. $y = \frac{4}{x} + \tan\left(\frac{\pi x}{8}\right)$, $[1, 2]$