

In Exercises 13–32, find the vertical asymptotes (if any) of the graph of the function.

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

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

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

17. $g(t) = \frac{t - 1}{t^2 + 1}$

19. $h(x) = \frac{x^2 - 2}{x^2 - x - 2}$

21. $T(t) = 1 - \frac{4}{t^2}$

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

In Exercises 33–36, determine whether the graph of the function has a vertical asymptote or a removable discontinuity at $x = -1$. Graph the function using a graphing utility to confirm your answer.

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

34. $f(x) = \frac{x^2 - 6x - 7}{x + 1}$

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

36. $f(x) = \frac{\sin(x + 1)}{x + 1}$

In Exercises 37–54, find the limit (if it exists).

37. $\lim_{x \rightarrow -1^+} \frac{1}{x + 1}$

38. $\lim_{x \rightarrow 1^-} \frac{-1}{(x - 1)^2}$

39. $\lim_{x \rightarrow 2^+} \frac{x}{x - 2}$

40. $\lim_{x \rightarrow 1^+} \frac{2 + x}{1 - x}$

41. $\lim_{x \rightarrow 1^+} \frac{x^2}{(x - 1)^2}$

42. $\lim_{x \rightarrow 4^-} \frac{x^2}{x^2 + 16}$

43. $\lim_{x \rightarrow -3^-} \frac{x + 3}{x^2 + x - 6}$

44. $\lim_{x \rightarrow (-1/2)^+} \frac{6x^2 + x - 1}{4x^2 - 4x - 3}$

45. $\lim_{x \rightarrow 1} \frac{x - 1}{(x^2 + 1)(x - 1)}$

46. $\lim_{x \rightarrow 3} \frac{x - 2}{x^2}$

47. $\lim_{x \rightarrow 0^-} \left(1 + \frac{1}{x}\right)$

48. $\lim_{x \rightarrow 0^-} \left(x^2 - \frac{1}{x}\right)$