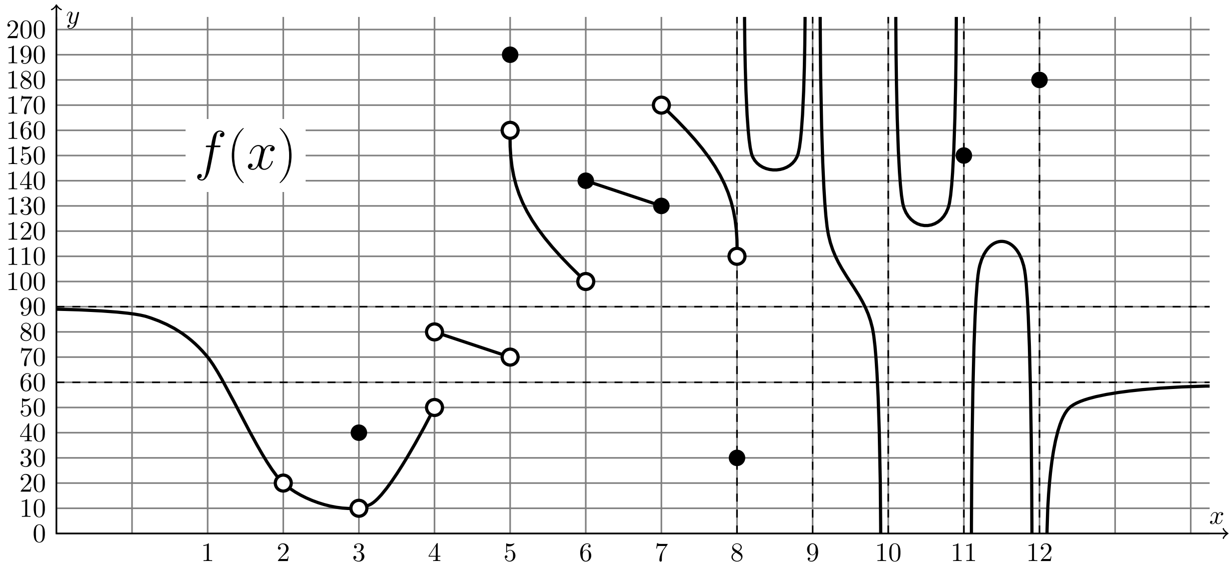


1 Finding Limits Graphically

1. $$\begin{cases} f(1) = \\ \lim\limits_{x\to\mathbf{1}^-} f(x) = \\ \lim\limits_{x\to\mathbf{1}^+} f(x) = \\ \lim\limits_{x\to\mathbf{1}} f(x) = \end{cases}$$

2. $$\begin{cases} f(2) = \\ \lim\limits_{x\to\mathbf{2}^-} f(x) = \\ \lim\limits_{x\to\mathbf{2}^+} f(x) = \\ \lim\limits_{x\to\mathbf{2}} f(x) = \end{cases}$$

3. $$\begin{cases} f(3) = \\ \lim\limits_{x\to\mathbf{3}^-} f(x) = \\ \lim\limits_{x\to\mathbf{3}^+} f(x) = \\ \lim\limits_{x\to\mathbf{3}} f(x) = \end{cases}$$

4. $$\begin{cases} f(4) = \\ \lim\limits_{x\to\mathbf{4}^-} f(x) = \\ \lim\limits_{x\to\mathbf{4}^+} f(x) = \\ \lim\limits_{x\to\mathbf{4}} f(x) = \end{cases}$$

5. $$\begin{cases} f(5) = \\ \lim\limits_{x\to\mathbf{5}^-} f(x) = \\ \lim\limits_{x\to\mathbf{5}^+} f(x) = \\ \lim\limits_{x\to\mathbf{5}} f(x) = \end{cases}$$

6. $$\begin{cases} f(6) = \\ \lim\limits_{x\to\mathbf{6}^-} f(x) = \\ \lim\limits_{x\to\mathbf{6}^+} f(x) = \\ \lim\limits_{x\to\mathbf{6}} f(x) = \end{cases}$$

7. $$\begin{cases} f(7) = \\ \lim\limits_{x\to\mathbf{7}^-} f(x) = \\ \lim\limits_{x\to\mathbf{7}^+} f(x) = \\ \lim\limits_{x\to\mathbf{7}} f(x) = \end{cases}$$

2 Infinite Limits and Limits at Infinity

8. $$\begin{cases} g(8) = \\ \lim\limits_{x\to\mathbf{8}^-} g(x) = \\ \lim\limits_{x\to\mathbf{8}^+} g(x) = \\ \lim\limits_{x\to\mathbf{8}} g(x) = \end{cases}$$

9. $$\begin{cases} g(9) = \\ \lim\limits_{x\to\mathbf{9}^-} g(x) = \\ \lim\limits_{x\to\mathbf{9}^+} g(x) = \\ \lim\limits_{x\to\mathbf{9}} g(x) = \end{cases}$$

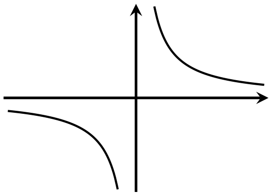
10. $$\begin{cases} g(10) = \\ \lim\limits_{x\to\mathbf{10}^-} g(x) = \\ \lim\limits_{x\to\mathbf{10}^+} g(x) = \\ \lim\limits_{x\to\mathbf{10}} g(x) = \end{cases}$$

11. $$\begin{cases} g(11) = \\ \lim\limits_{x\to\mathbf{11}^-} g(x) = \\ \lim\limits_{x\to\mathbf{11}^+} g(x) = \\ \lim\limits_{x\to\mathbf{11}} g(x) = \end{cases}$$

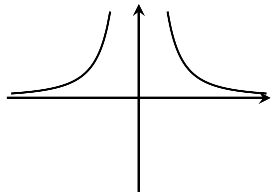
12. $$\begin{cases} g(12) = \\ \lim\limits_{x\to\mathbf{12}^-} g(x) = \\ \lim\limits_{x\to\mathbf{12}^+} g(x) = \\ \lim\limits_{x\to\mathbf{12}} g(x) = \end{cases}$$

13. $\lim\limits_{x\to-\infty} g(x) =$

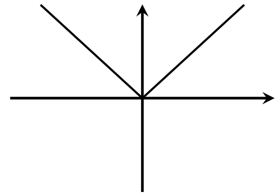
14. $\lim\limits_{x\to+\infty} g(x) =$

15. 

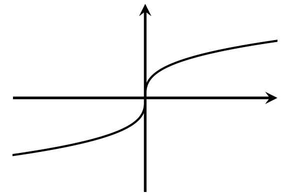
$$f(x) = 1/x$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

16. 

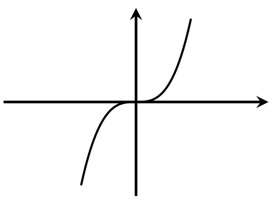
$$f(x) = 1/x^2$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

17. 

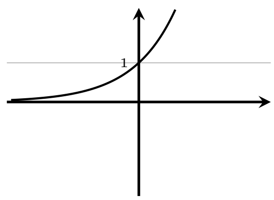
$$f(x) = |x|$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

18. 

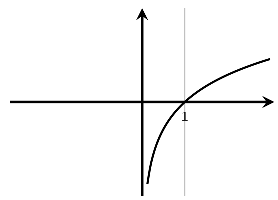
$$f(x) = \sqrt[3]{x}$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

19. 

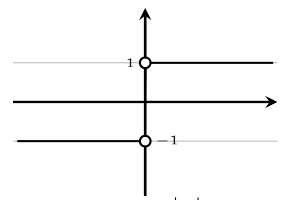
$$f(x) = x^3$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

20. 

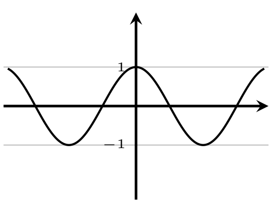
$$f(x) = e^x$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

21. 

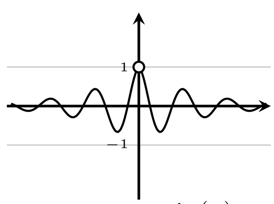
$$f(x) = \ln(x)$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

22. 

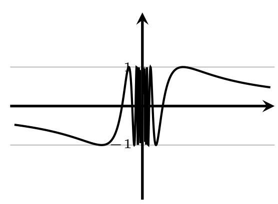
$$f(x) = \frac{|x|}{x}$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

23. 

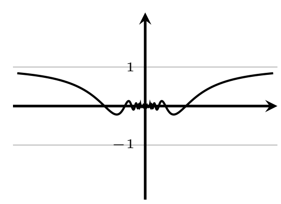
$$f(x) = \cos(x)$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

24. 

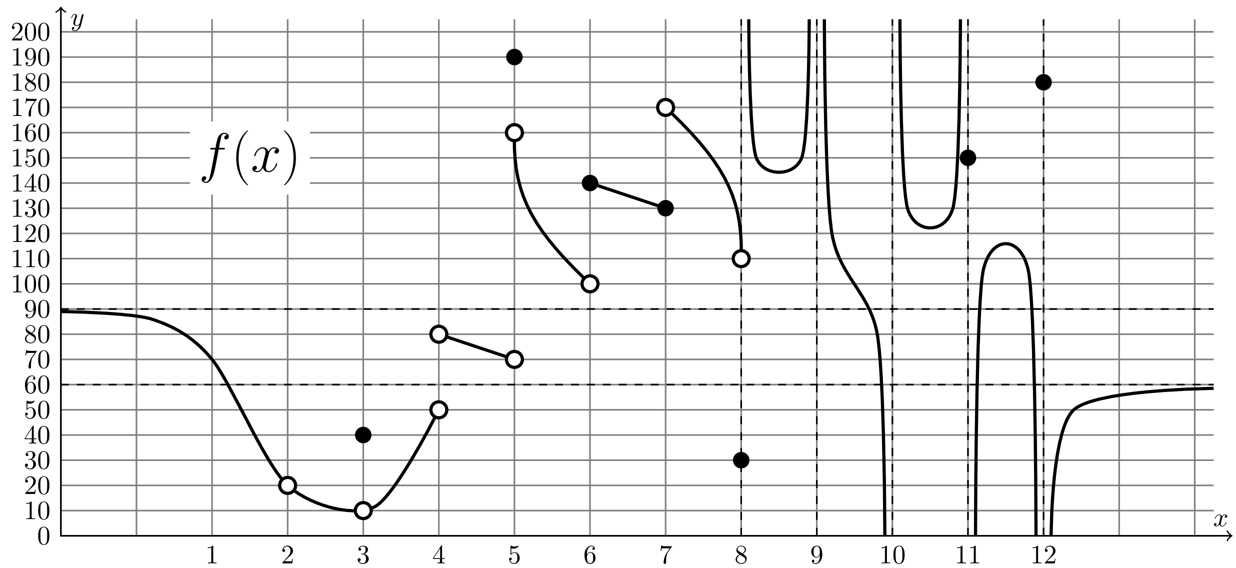
$$f(x) = \frac{\sin(x)}{x}$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

25. 

$$f(x) = \sin(1/x)$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$

26. 

$$f(x) = x\sin(1/x)$$
$$f(0) =$$
$$\lim_{x\to\mathbf{0}^-} f(x) =$$
$$\lim_{x\to\mathbf{0}^+} f(x) =$$
$$\lim_{x\to\mathbf{0}} f(x) =$$
$$\lim_{x\to-\infty} f(x) =$$
$$\lim_{x\to+\infty} f(x) =$$



3 Identify Continuity/Discontinuity at a Point

27. We say $f(x)$ is ______________________ if $\lim_{x \to a} f(x)$ exists and equals $f(a)$.
28. We say $f(x)$ has a ______________________ at $x = a$ if $\lim_{x \to a} f(x)$ exists and does *not* equal $f(a)$.
29. We say $f(x)$ has a ______________________ if $\lim_{x \to a^+} f(x)$ and $\lim_{x \to a^-} f(x)$ exist and are *un*equal.
30. We say $f(x)$ has an ______________________ if either $\lim_{x \to a^+} f(x)$ or $\lim_{x \to a^-} f(x)$ equals either ∞ or $-\infty$.
31. The function $f(x)$ is **continuous at $x =$** ______________________.
32. The function $f(x)$ is has a **removable discontinuity at $x =$** ______________________.
33. The function $f(x)$ is has a **jump discontinuity at $x =$** ______________________.
34. The function $f(x)$ is has an **infinite discontinuity at $x =$** ______________________.

4 Identify Left and Right Continuity at a Point

35. We say $f(x)$ is ______________________ if $\lim_{x \to a^-} f(x)$ exists and equals $f(a)$.
36. We say $f(x)$ is ______________________ if $\lim_{x \to a^+} f(x)$ exists and equals $f(a)$.
37. The function $f(x)$ is **left continuous at $x =$** ______________________.
38. The function $f(x)$ is **right continuous at $x =$** ______________________.

5 Continuity on an Interval

We say $f(x)$ is **continuous on (a, b)** if $f(x)$ is continuous at $x = c$ for all c in (a, b).

39. We say $f(x)$ is **continuous on $[a, b]$** if $f(x)$ is continuous at $x = c$ for all c in (a, b),

    and ______________________ and ______________________.
40. We say $f(x)$ is **continuous everywhere** if $f(x)$ is continuous at $x = c$ for all c in ____________.
41. We say $f(x)$ is **continuous** if it is continuous on every open interval in ______________________.
42. Find the union of all open intervals (a, b) such that $f(x)$ is **continuous on (a, b)**. Use interval notation.
43. The function $f(x)$ fails to be **continuous** (on every open interval in its domain). It fails at $x =$ ____________.