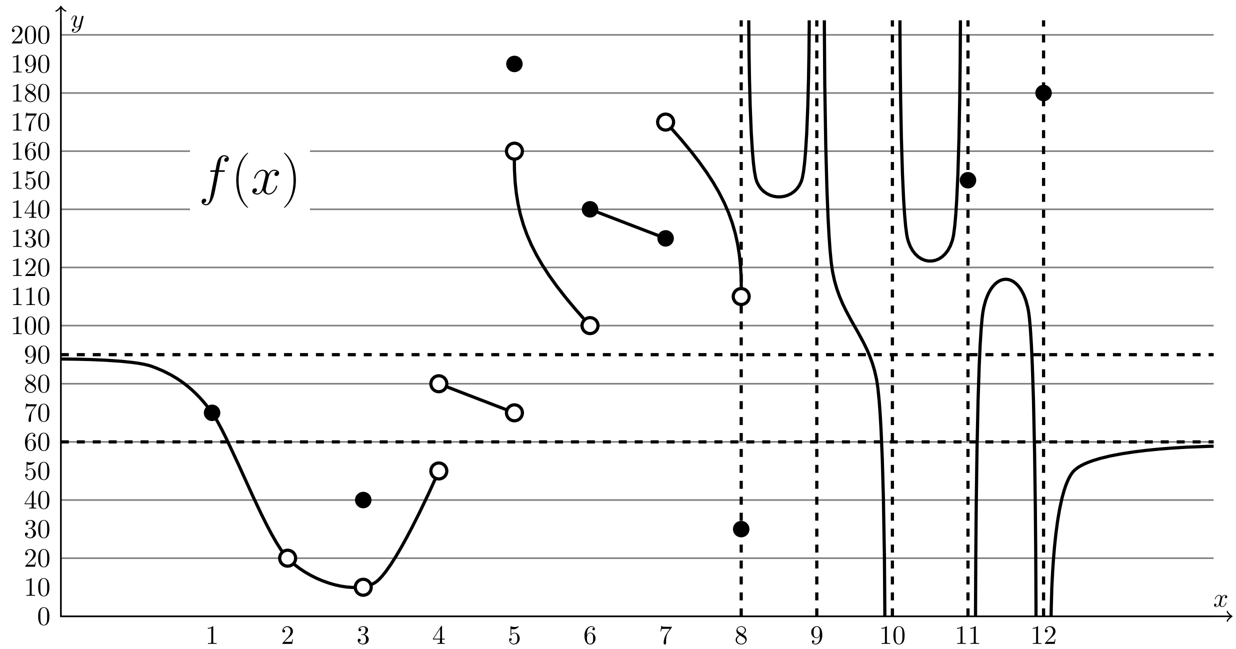


1 Find Limits Graphically

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

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

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

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

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

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

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

2 Find Limits Involving Infinity Graphically

8. $\begin{cases} f(8) = \\ \lim_{x\to \mathbf{8}^-} f(x) = \\ \lim_{x\to \mathbf{8}^+} f(x) = \\ \lim_{x\to \mathbf{8}} f(x) = \end{cases}$

9. $\begin{cases} f(9) = \\ \lim_{x\to \mathbf{9}^-} f(x) = \\ \lim_{x\to \mathbf{9}^+} f(x) = \\ \lim_{x\to \mathbf{9}} f(x) = \end{cases}$

10. $\begin{cases} f(10) = \\ \lim_{x\to \mathbf{10}^-} f(x) = \\ \lim_{x\to \mathbf{10}^+} f(x) = \\ \lim_{x\to \mathbf{10}} f(x) = \end{cases}$

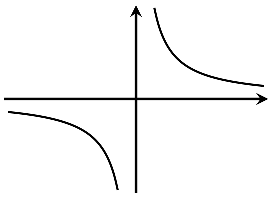
11. $\begin{cases} f(11) = \\ \lim_{x\to \mathbf{11}^-} f(x) = \\ \lim_{x\to \mathbf{11}^+} f(x) = \\ \lim_{x\to \mathbf{11}} f(x) = \end{cases}$

12. $\begin{cases} f(12) = \\ \lim_{x\to \mathbf{12}^-} f(x) = \\ \lim_{x\to \mathbf{12}^+} f(x) = \\ \lim_{x\to \mathbf{12}} f(x) = \end{cases}$

13. $\lim_{x\to -\infty} f(x) =$

14. $\lim_{x\to +\infty} f(x) =$

3 Famous Functions

15. 

$f(x) = 1/x$

$f(0) =$

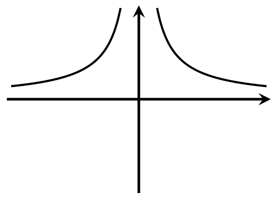
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

16. 

$f(x) = 1/x^2$

$f(0) =$

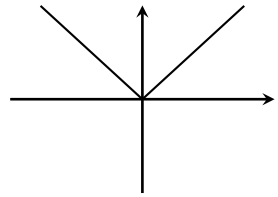
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

17. 

$f(x) = |x|$

$f(0) =$

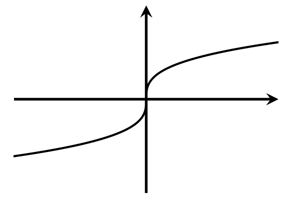
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

18. 

$f(x) = \sqrt[3]{x}$

$f(0) =$

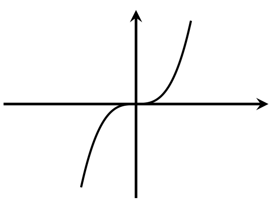
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

19. 

$f(x) = x^3$

$f(0) =$

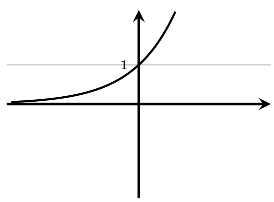
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

20. 

$f(x) = e^x$

$f(0) =$

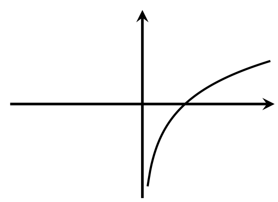
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

21. 

$f(x) = \ln(x)$

$f(0) =$

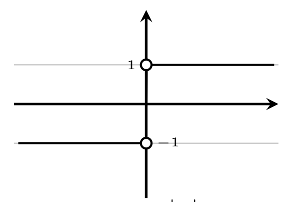
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

22. 

$f(x) = \dfrac{|x|}{x}$

$f(0) =$

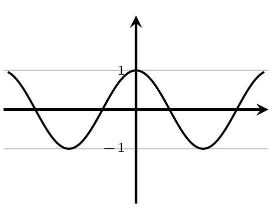
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

23. 

$f(x) = \cos(x)$

$f(0) =$

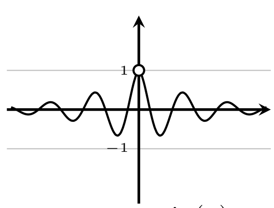
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) = \text{DNE}$

$\lim_{x\to+\infty} f(x) = \text{DNE}$

24. 

$f(x) = \dfrac{\sin(x)}{x}$

$f(0) =$

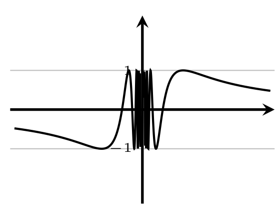
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

25. 

$f(x) = \sin(1/x)$

$f(0) = \text{undefined}$

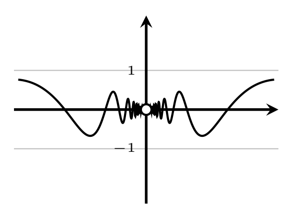
$\lim_{x\to\mathbf{0}^-} f(x) = \text{DNE}$

$\lim_{x\to\mathbf{0}^+} f(x) = \text{DNE}$

$\lim_{x\to\mathbf{0}} f(x) = \text{DNE}$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$

26. 

$f(x) = x\sin(1/x)$

$f(0) =$

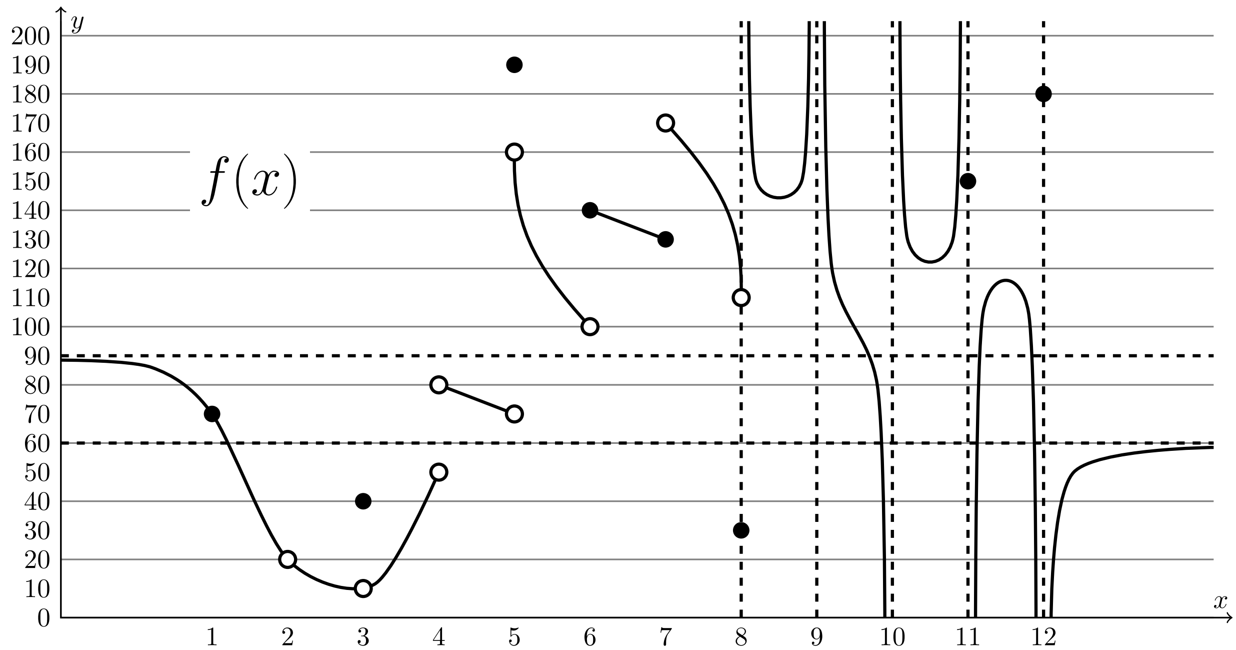
$\lim_{x\to\mathbf{0}^-} f(x) =$

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

$\lim_{x\to\mathbf{0}} f(x) =$

$\lim_{x\to-\infty} f(x) =$

$\lim_{x\to+\infty} f(x) =$



4 Identify Infinite, Jump, Removable Discontinuities Graphically

27. We say f is **continuous** (cts) at $x = a$ if $\lim\limits_{x \to a} f(x)$ is finite and equals $f(a)$.

    The function f above is continuous at integers $x =$ ______________________________.

28. We say f has a _______________ discontinuity at ________ if $\lim\limits_{x \to a} f(x)$ is finite and *un*equal to $f(a)$.

    The function f above has this type of discontinuity at integers $x =$ ______________________________.

29. We say f has a _______________ discontinuity at ________ if $\lim\limits_{x \to a^+} f(x)$ and $\lim\limits_{x \to a^-} f(x)$ are finite but *un*equal.

    The function f above has this type of discontinuity at integers $x =$ ______________________________.

30. We say f has an _______________ discontinuity at ________ if $\lim\limits_{x \to a^+} f(x)$ or $\lim\limits_{x \to a^-} f(x)$ is infinite.

    The function f above has this type of discontinuity at integers $x =$ ______________________________.

5 Continuity on an Interval

31. We say f is **continuous on the open interval (a, b)** if f is continuous at every x in (a, b).
    Find the union of all open intervals **on which f is continuous**.

    (Set-builder notation) ____

    (Interval notation) ____

32. We say f is **continuous everywhere** if f is continuous at every x in _______________.

33. We say f is **a continuous function** if f is continuous at every x in its _______________.

6 Left and Right Continuity

34. We say f is _______________ continuous at $x = a$ if $\lim_{x \to a^+} f(x)$ is finite and equals $f(a)$.

    The function f above has this type of continuity at integers $x =$ ______________________________.

35. We say f is _______________ continuous at $x = a$ if $\lim_{x \to a^-} f(x)$ is finite and equals $f(a)$.

    The function f above has this type of continuity at integers $x =$ ______________________________.

36. We say f is **continuous on the closed interval $[a, b]$** if f is continuous at every x in the *open* interval (a, b) and is ______________________________ at $x = a$ and is ______________________________ at $x = b$.