

10.3 More on Limits

Target 9B: Evaluate a limit of a function numerically
Target 9D: Calculate one-sided limits and two-sided limits

Review of Prior Concepts

Graph function $h(x)$ such that it has all of the characteristics below:

$h(-3) = 0, h(0) = 4$ and $h(1) = 1$

$h(3) = 1$ and $h(5) = 2$

$\lim_{x \rightarrow 0^+} h(x) = 1$

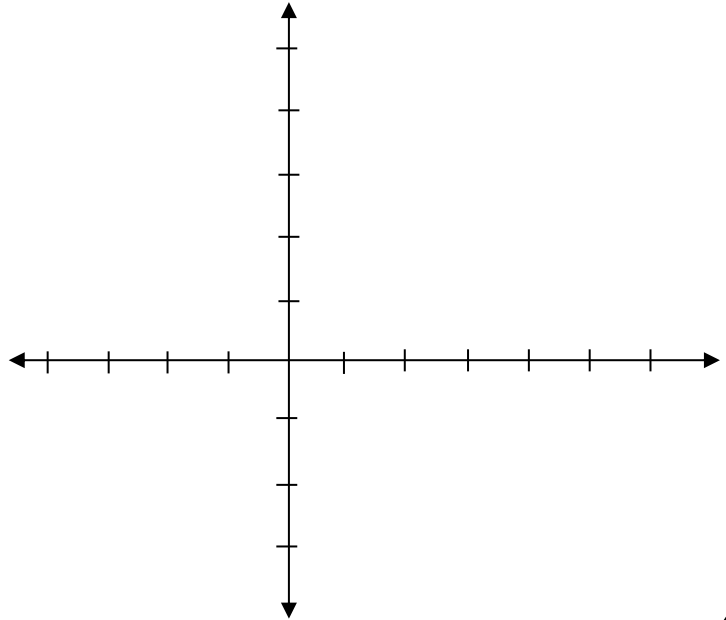
$\lim_{x \rightarrow 0^-} h(x) = 4$

$\lim_{x \rightarrow 3^+} h(x) = 2$

$\lim_{x \rightarrow 3^-} h(x) = 1$

$\lim_{x \rightarrow -\infty} h(x) = -\infty$

$\lim_{x \rightarrow \infty} h(x) = \infty$



More Practice

Limits Graphically

- <http://www.coolmath.com/precaculus-review-calculus-intro/precaculus-algebra/21-rational-functions-limits-infinity-right-left-01>
- <https://www.khanacademy.org/math/ap-calculus-ab/limits-basics-ab/limits-from-graphs-ab/v/limits-from-graphs-undefined>
- <http://precaculus.flippedmath.com/23-limits-graphically.html>
- <http://philschatz.com/precaculus-book/contents/m49452.html>
- <http://www.mathsisfun.com/calculus/limits.html>
- <https://youtu.be/IklVRSonvFQ>
- <https://youtu.be/UkjgJQaGx98>
- https://youtu.be/XOu_LFGai0A

Finding Limits Numerically

- Use a table of values to find the limit.

Examples:

1. Find $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$

x				3			
$f(x)$							

2. Find $\lim_{x \rightarrow 4} \sqrt{x - 4}$

x						
$f(x)$						

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

x						
$f(x)$						

4. Find $\lim_{x \rightarrow 5} \frac{1}{x^2 - 25}$

x						
$f(x)$						

Limits of Piecewise Functions

Examples:

1. $f(x) = \begin{cases} 2 - x, & \text{if } x < -2 \\ x^2, & \text{if } x \geq -2 \end{cases}$

Find:

a) $\lim_{x \rightarrow -2^-} f(x)$

b) $\lim_{x \rightarrow -2^+} f(x)$

c) $\lim_{x \rightarrow -2} f(x)$

d) $f(-2)$

$$2. f(x) = \begin{cases} x - 4, & \text{if } x < 3 \\ 5, & \text{if } x = 3 \\ 8 - x^2, & \text{if } x > 3 \end{cases}$$

Find:

a) $\lim_{x \rightarrow 3^-} f(x)$

b) $\lim_{x \rightarrow 3^+} f(x)$

c) $\lim_{x \rightarrow 3} f(x)$

d) $f(3)$

More Practice

Limits Numerically

<https://www.khanacademy.org/math/ap-calculus-ab/limits-basics-ab/limits-from-tables-ab/v/limit-by-analyzing-numerical-data>

<https://ww2.coastal.edu/aicogni/Numerical-Limits.pdf>

<http://www.rootmath.org/calculus/estimating-limits-numerically>

<http://goblues.org/faculty/kollathl/files/2010/08/Limits-and-Calculus-slides.pdf>

<https://youtu.be/13a3yGKdED4>

<https://youtu.be/AFIGjj2cWLY>

<https://youtu.be/17Tcay720vw>

Piece-Wise Functions

<https://www.khanacademy.org/math/ap-calculus-ab/limits-from-equations-ab/limits-of-piecewise-functions-ab/v/limit-of-piecewise-function-that-is-defined>

<http://www.mathwarehouse.com/calculus/limits/limits-with-piecewise-functions.php>

<https://youtu.be/n0c2DQ00k80>

<https://youtu.be/m-8zaGdm5zA>

<https://youtu.be/Jb09ky2gOVc>

Homework Assignment

Limits Numerically Worksheet