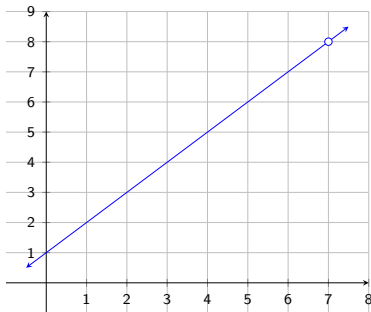


Limits and Algebra

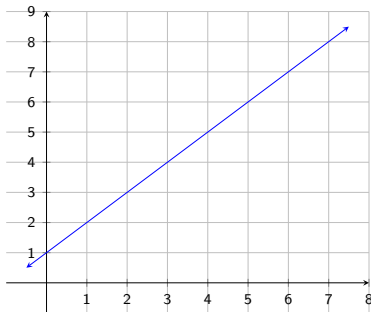
The graphs of $f(x) = \frac{x^2 - 6x - 7}{x - 7}$ and $g(x) = x + 1$ are not the same.

Intro

The graphs of $f(x) = \frac{x^2 - 6x - 7}{x - 7}$ and $g(x) = x + 1$ are not the same.



$$f(x) = \frac{x^2 - 6x - 7}{x - 7}$$



$$g(x) = x + 1$$

Objectives

- 1 Find Limits via Factoring
- 2 Limits with Complex Fractions
- 3 Limits with Radicals
- 4 Limits with Absolute Value

Algebraic Limits

Some limits that can't be evaluated directly can be evaluated after
cancelling out common factors.

Algebraic Limits

Some limits that can't be evaluated directly can be evaluated after **cancelling out common factors**.

This is called **removable discontinuity**.

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

$$\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3} = \lim_{x \rightarrow -3} \frac{(x + 3)(x + 1)}{x + 3}$$

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

$$\begin{aligned}\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3} &= \lim_{x \rightarrow -3} \frac{(x + 3)(x + 1)}{x + 3} \\ &= \lim_{x \rightarrow -3} \frac{\cancel{(x + 3)}(x + 1)}{\cancel{(x + 3)}}\end{aligned}$$

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

$$\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3} = \lim_{x \rightarrow -3} \frac{(x + 3)(x + 1)}{x + 3}$$

$$= \lim_{x \rightarrow -3} \frac{\cancel{(x + 3)}(x + 1)}{\cancel{(x + 3)}}$$

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

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

$$\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3} = \lim_{x \rightarrow -3} \frac{(x + 3)(x + 1)}{x + 3}$$

$$= \lim_{x \rightarrow -3} \frac{\cancel{(x + 3)}(x + 1)}{\cancel{(x + 3)}}$$

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

$$= -3 + 1$$

Example 1

(a) Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3}$

$$\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x + 3} = \lim_{x \rightarrow -3} \frac{(x + 3)(x + 1)}{x + 3}$$

$$= \lim_{x \rightarrow -3} \frac{\cancel{(x + 3)}(x + 1)}{\cancel{(x + 3)}}$$

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

$$= -3 + 1$$

$$= -2$$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x + 2}{x^2 + 7x + 10}$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10}$

$$\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10} = \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x+5)}$$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10}$

$$\begin{aligned}\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10} &= \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x+5)} \\ &= \lim_{x \rightarrow -2} \frac{\cancel{x+2}}{\cancel{(x+2)}(x+5)}\end{aligned}$$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10}$

$$\begin{aligned}\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10} &= \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x+5)} \\ &= \lim_{x \rightarrow -2} \frac{\cancel{x+2}}{(\cancel{x+2})(x+5)} \\ &= \lim_{x \rightarrow -2} \frac{1}{x+5}\end{aligned}$$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10}$

$$\begin{aligned}\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10} &= \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x+5)} \\&= \lim_{x \rightarrow -2} \frac{\cancel{x+2}}{\cancel{(x+2)}(x+5)} \\&= \lim_{x \rightarrow -2} \frac{1}{x+5} \\&= \frac{1}{-2+5}\end{aligned}$$

Example 1

(b) Evaluate $\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10}$

$$\begin{aligned}\lim_{x \rightarrow -2} \frac{x+2}{x^2+7x+10} &= \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x+5)} \\&= \lim_{x \rightarrow -2} \frac{\cancel{x+2}}{\cancel{(x+2)}(x+5)} \\&= \lim_{x \rightarrow -2} \frac{1}{x+5} \\&= \frac{1}{-2+5} \\&= \frac{1}{3}\end{aligned}$$

Objectives

- 1 Find Limits via Factoring
- 2 Limits with Complex Fractions
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Complex Fractions

Simplify the complex fraction by multiplying every term by the **least common tiny denominator**.

Example 2

Evaluate each.

$$(a) \quad \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right)$$

Example 2

Evaluate each.

$$(a) \quad \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right)$$

$$\lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right) = \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right) \left(\frac{5x}{5x} \right)$$

Example 2

Evaluate each.

$$(a) \quad \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right)$$

$$\begin{aligned} \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right) &= \lim_{x \rightarrow -5} \left(\frac{\frac{1}{x} + \frac{1}{5}}{x + 5} \right) \left(\frac{5x}{5x} \right) \\ &= \lim_{x \rightarrow -5} \frac{5 + x}{5x(x + 5)} \end{aligned}$$

Example 2

$$= \lim_{x \rightarrow -5} \frac{\cancel{5+x}}{5x(\cancel{x+5})}$$

Example 2

$$= \lim_{x \rightarrow -5} \frac{\cancel{5+x}}{5x(\cancel{x+5})}$$

$$= \lim_{x \rightarrow -5} \frac{1}{5x}$$

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$$= \lim_{x \rightarrow -5} \frac{\cancel{5+x}}{5x(\cancel{x+5})}$$

$$= \lim_{x \rightarrow -5} \frac{1}{5x}$$

$$= \frac{1}{5(-5)}$$

Example 2

$$= \lim_{x \rightarrow -5} \frac{\cancel{5+x}}{5x(\cancel{x+5})}$$

$$= \lim_{x \rightarrow -5} \frac{1}{5x}$$

$$= \frac{1}{5(-5)}$$

$$= -\frac{1}{25}$$

Example 2

$$(b) \quad \lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right)$$

Example 2

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$$\lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right) = \lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right) \left(\frac{3x}{3x} \right)$$

Example 2

$$(b) \quad \lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right)$$

$$\begin{aligned} \lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right) &= \lim_{x \rightarrow 3} \left(\frac{\frac{1}{3} - \frac{1}{x}}{3 - x} \right) \left(\frac{3x}{3x} \right) \\ &= \lim_{x \rightarrow 3} \frac{3 - x}{3x(x - 3)} \end{aligned}$$

Example 2

$$= \lim_{x \rightarrow 3} \frac{\cancel{3-x}}{3x(\cancel{x-3})}$$

Example 2

$$= \lim_{x \rightarrow 3} \frac{\cancel{3-x}}{3x(\cancel{x-3})}$$

$$= \lim_{x \rightarrow 3} \frac{-1}{3x}$$

Example 2

$$= \lim_{x \rightarrow 3} \frac{\cancel{3-x}}{3x(\cancel{x-3})}$$

$$= \lim_{x \rightarrow 3} \frac{-1}{3x}$$

$$= \frac{-1}{3(3)}$$

Example 2

$$= \lim_{x \rightarrow 3} \frac{\cancel{3-x}}{3x(\cancel{x-3})}$$

$$= \lim_{x \rightarrow 3} \frac{-1}{3x}$$

$$= \frac{-1}{3(3)}$$

$$= \frac{-1}{9}$$

Objectives

- 1 Find Limits via Factoring
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Radicals

When working with radicals, multiply by the **conjugate**.

Expression	Conjugate
$a + \sqrt{b}$	$a - \sqrt{b}$
$a - \sqrt{b}$	$a + \sqrt{b}$

Example 3

$$(a) \quad \lim_{x \rightarrow 0} \left(\frac{\sqrt{25 - x} - 5}{x} \right)$$

Example 3

$$(a) \quad \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right)$$

$$\lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) = \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) \left(\frac{\sqrt{25-x} + 5}{\sqrt{25-x} + 5} \right)$$

Example 3

$$(a) \quad \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right)$$

$$\begin{aligned} \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) &= \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) \left(\frac{\sqrt{25-x} + 5}{\sqrt{25-x} + 5} \right) \\ &= \lim_{x \rightarrow 0} \frac{25 - x - 25}{x(\sqrt{25-x} + 5)} \end{aligned}$$

Example 3

$$(a) \quad \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right)$$

$$\lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) = \lim_{x \rightarrow 0} \left(\frac{\sqrt{25-x} - 5}{x} \right) \left(\frac{\sqrt{25-x} + 5}{\sqrt{25-x} + 5} \right)$$

$$= \lim_{x \rightarrow 0} \frac{25 - x - 25}{x(\sqrt{25-x} + 5)}$$

$$= \lim_{x \rightarrow 0} \frac{-x}{x(\sqrt{25-x} + 5)}$$

Example 3

$$= \lim_{x \rightarrow 0} \frac{-1}{\sqrt{25 - x} + 5}$$

Example 3

$$= \lim_{x \rightarrow 0} \frac{-1}{\sqrt{25 - x} + 5}$$

$$= \frac{-1}{\sqrt{25 - 0} + 5}$$

Example 3

$$= \lim_{x \rightarrow 0} \frac{-1}{\sqrt{25 - x} + 5}$$

$$= \frac{-1}{\sqrt{25 - 0} + 5}$$

$$= \frac{-1}{10}$$

Example 3

$$(b) \quad \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right)$$

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$$\lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) = \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) \left(\frac{\sqrt{16+h} + 4}{\sqrt{16+h} + 4} \right)$$

Example 3

$$(b) \quad \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right)$$

$$\begin{aligned} \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) &= \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) \left(\frac{\sqrt{16+h} + 4}{\sqrt{16+h} + 4} \right) \\ &= \lim_{h \rightarrow 0} \frac{16 + h - 16}{h(\sqrt{16+h} + 4)} \end{aligned}$$

Example 3

$$(b) \quad \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right)$$

$$\lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) = \lim_{h \rightarrow 0} \left(\frac{\sqrt{16+h} - 4}{h} \right) \left(\frac{\sqrt{16+h} + 4}{\sqrt{16+h} + 4} \right)$$

$$= \lim_{h \rightarrow 0} \frac{16 + h - 16}{h(\sqrt{16+h} + 4)}$$

$$= \lim_{h \rightarrow 0} \frac{h}{h(\sqrt{16+h} + 4)}$$

Example 3

$$= \lim_{h \rightarrow 0} \frac{1}{\sqrt{16 + h} + 4}$$

Example 3

$$= \lim_{h \rightarrow 0} \frac{1}{\sqrt{16 + h} + 4}$$

$$= \frac{1}{\sqrt{16 + 0} + 4}$$

Example 3

$$= \lim_{h \rightarrow 0} \frac{1}{\sqrt{16 + h} + 4}$$

$$= \frac{1}{\sqrt{16 + 0} + 4}$$

$$= \frac{1}{8}$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

$$\lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} = \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} \left(\frac{\sqrt{x} + 2}{\sqrt{x} + 2} \right)$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

$$\begin{aligned} \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} &= \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} \left(\frac{\sqrt{x} + 2}{\sqrt{x} + 2} \right) \\ &= \lim_{x \rightarrow 4} \frac{(4 - x)(\sqrt{x} + 2)}{x - 4} \end{aligned}$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

$$\lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} = \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} \left(\frac{\sqrt{x} + 2}{\sqrt{x} + 2} \right)$$

$$= \lim_{x \rightarrow 4} \frac{(4 - x)(\sqrt{x} + 2)}{x - 4}$$

$$= \lim_{x \rightarrow 4} -1(\sqrt{x} + 2)$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

$$\lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} = \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} \left(\frac{\sqrt{x} + 2}{\sqrt{x} + 2} \right)$$

$$= \lim_{x \rightarrow 4} \frac{(4 - x)(\sqrt{x} + 2)}{x - 4}$$

$$= \lim_{x \rightarrow 4} -1(\sqrt{x} + 2)$$

$$= -1(\sqrt{4} + 2)$$

Example 3

$$(c) \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2}$$

$$\lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} = \lim_{x \rightarrow 4} \frac{4 - x}{\sqrt{x} - 2} \left(\frac{\sqrt{x} + 2}{\sqrt{x} + 2} \right)$$

$$= \lim_{x \rightarrow 4} \frac{(4 - x)(\sqrt{x} + 2)}{x - 4}$$

$$= \lim_{x \rightarrow 4} -1(\sqrt{x} + 2)$$

$$= -1(\sqrt{4} + 2)$$

$$= -1(2 + 2) = -4$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

$$\lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} = \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} \left(\frac{\sqrt{x} + \sqrt{3}}{\sqrt{x} + \sqrt{3}} \right)$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

$$\begin{aligned} \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} &= \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} \left(\frac{\sqrt{x} + \sqrt{3}}{\sqrt{x} + \sqrt{3}} \right) \\ &= \lim_{x \rightarrow 3} \frac{(x - 3)(\sqrt{x} + \sqrt{3})}{x - 3} \end{aligned}$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

$$\lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} = \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} \left(\frac{\sqrt{x} + \sqrt{3}}{\sqrt{x} + \sqrt{3}} \right)$$

$$= \lim_{x \rightarrow 3} \frac{(x - 3)(\sqrt{x} + \sqrt{3})}{x - 3}$$

$$= \lim_{x \rightarrow 3} (\sqrt{x} + \sqrt{3})$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

$$\lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} = \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} \left(\frac{\sqrt{x} + \sqrt{3}}{\sqrt{x} + \sqrt{3}} \right)$$

$$= \lim_{x \rightarrow 3} \frac{(x - 3)(\sqrt{x} + \sqrt{3})}{x - 3}$$

$$= \lim_{x \rightarrow 3} (\sqrt{x} + \sqrt{3})$$

$$= \sqrt{3} + \sqrt{3}$$

Example 3

$$(d) \quad \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}}$$

$$\lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} = \lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x} - \sqrt{3}} \left(\frac{\sqrt{x} + \sqrt{3}}{\sqrt{x} + \sqrt{3}} \right)$$

$$= \lim_{x \rightarrow 3} \frac{(x - 3)(\sqrt{x} + \sqrt{3})}{x - 3}$$

$$= \lim_{x \rightarrow 3} (\sqrt{x} + \sqrt{3})$$

$$= \sqrt{3} + \sqrt{3}$$

$$= 2\sqrt{3}$$

Objectives

- 1 Find Limits via Factoring
- 2 Limits with Complex Fractions
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- 4 Limits with Absolute Value

Limits and Absolute Value

With absolute value, it might be better to use a table or a graph to find the limit.

Limits and Absolute Value

With absolute value, it might be better to use a table or a graph to find the limit.

Also, look at the left-hand and right-hand limits.

Example 4

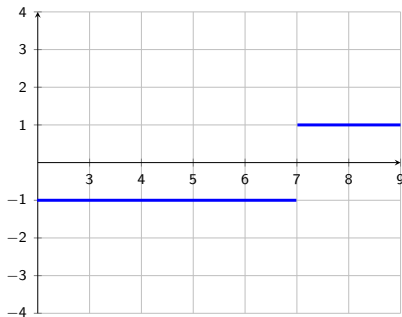
Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$

Example 4

Find the limit for each.

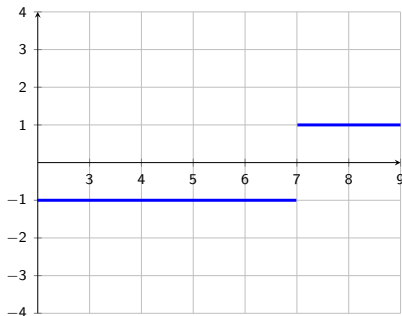
(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$



Example 4

Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$

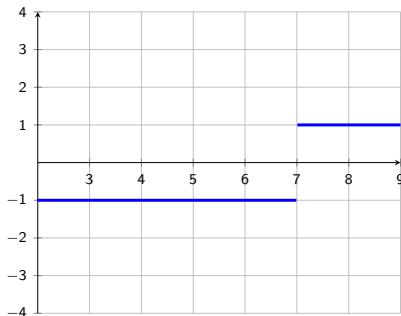


$$\lim_{x \rightarrow 7^-} \frac{|x - 7|}{x - 7}$$

Example 4

Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$

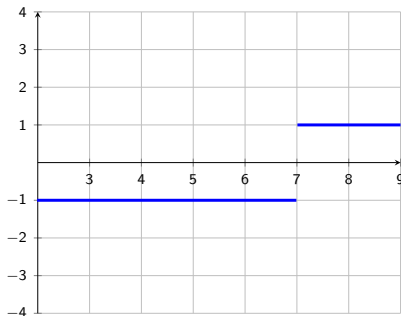


$$\lim_{x \rightarrow 7^-} \frac{|x - 7|}{x - 7} = -1$$

Example 4

Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$



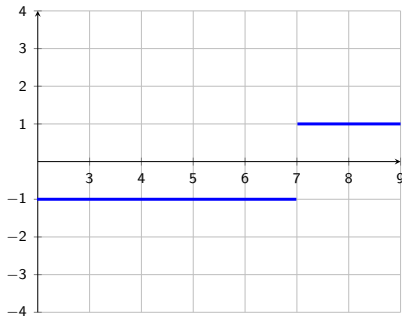
$$\lim_{x \rightarrow 7^-} \frac{|x - 7|}{x - 7} = -1$$

$$\lim_{x \rightarrow 7^+} \frac{|x - 7|}{x - 7}$$

Example 4

Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$



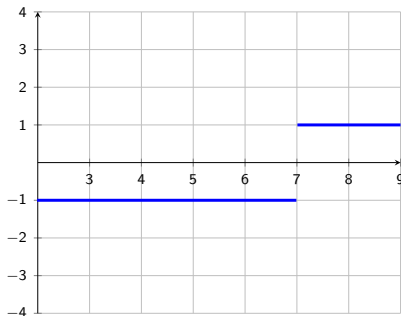
$$\lim_{x \rightarrow 7^-} \frac{|x - 7|}{x - 7} = -1$$

$$\lim_{x \rightarrow 7^+} \frac{|x - 7|}{x - 7} = 1$$

Example 4

Find the limit for each.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$



$$\lim_{x \rightarrow 7^-} \frac{|x - 7|}{x - 7} = -1$$

$$\lim_{x \rightarrow 7^+} \frac{|x - 7|}{x - 7} = 1$$

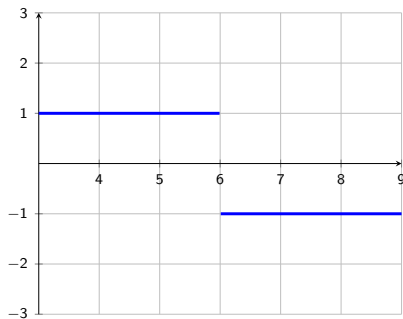
Does Not Exist

Example 4

$$(b) \quad \lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|}$$

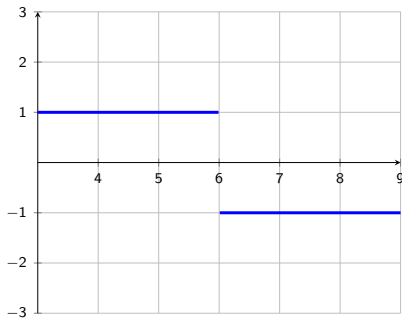
Example 4

(b) $\lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|}$



Example 4

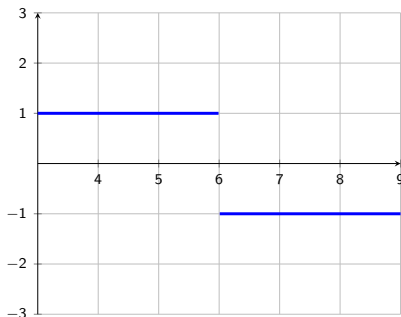
(b) $\lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|}$



$$\lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|}$$

Example 4

(b) $\lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|}$



$$\lim_{x \rightarrow 6^+} \frac{6 - x}{|x - 6|} = -1$$