

Computing Limits

Read the problem

Is the function continuous (at the point we're looking at)? (Can you draw it without lifting or stopping your pencil? Equivalently, when substituting the limit, do you get a "determinate" form?)

Determinate forms are numbers that we know how to work with in math. Indeterminate forms, the other kind, are those that are more difficult to work with like numbers divided by zero or infinity divided by infinity. We will learn how to work with these!

NO

Since it is discontinuous, two methods to reach an answer

YES

Substitute the limit into the function and do the arithmetic

Algebra

If all else fails...

Factor the function and look for common factors in numerator and denominator. You can cancel them as long as you note that they are not equal at the value of x that would make the common factor equal to 0.

Take x -values CLOSE TO BUT NOT EQUAL TO the limit value. The x -values should be both above and below the limit value. If the limit exists, the values above and below will approach the same value (otherwise the limit does not exist).

ANSWER!

Computing Limits

Read the problem

$$\lim_{x \rightarrow 0} \frac{x^2 + 5x + 2}{x + 1}$$

Is the function continuous (at the point we're looking at)? (Can you draw it without lifting or stopping your pencil? Equivalently, when substituting the limit, do you get a "determinate" form?)

Well rational functions are usually continuous and when I put in $x=0$, I get a value that is "nice" ...

YES

NO

Substitute the limit into the function and do the arithmetic

$$\lim_{x \rightarrow 0} \frac{0^2 + 5(0) + 2}{0 + 1} = 2$$

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Algebra

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ANSWER!

Computing Limits

Read the problem

$$\lim_{x \rightarrow -2} \frac{x^2 + 8x + 12}{x^2 - 4}$$

Is the function continuous (at the point we're looking at)? (Can you draw it without lifting or stopping your pencil? Equivalently, when substituting the limit, do you get a "determinate" form?)

When I put in $x=-2$, I get $0/0$...that's an indeterminate form

YES

NO

Since it is discontinuous, two methods to reach an answer

Substitute the limit into the function and do the arithmetic

$$\lim_{x \rightarrow -2} \frac{x^2 + 8x + 12}{x^2 - 4} = \lim_{x \rightarrow -2} \frac{(x+6)(x+2)}{(x-2)(x+2)}$$

Algebra

if $x \neq -2$,

$$= \lim_{x \rightarrow -2} \frac{x+6}{x-2} = -1$$

Factor the function and look for common factors in numerator and denominator. You can cancel them as long as you note that they are not equal at the value of x that would make the common factor equal to 0.

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ANSWER!

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Algebra
Factor the function and look for common factors in numerator and denominator. You can cancel them as long as you note that they are not equal at the value of x that would make the common factor equal to 0.

x	$\frac{x^2 + 8x + 12}{x^2 - 4}$
-1.9	-1.052
-1.99	-1.005
-1.999	-1.001
-2.1	-0.951
-2.01	-0.995
-2.001	-0.999

Approaches -1 from both sides, so -1 is the limit

ANSWER!