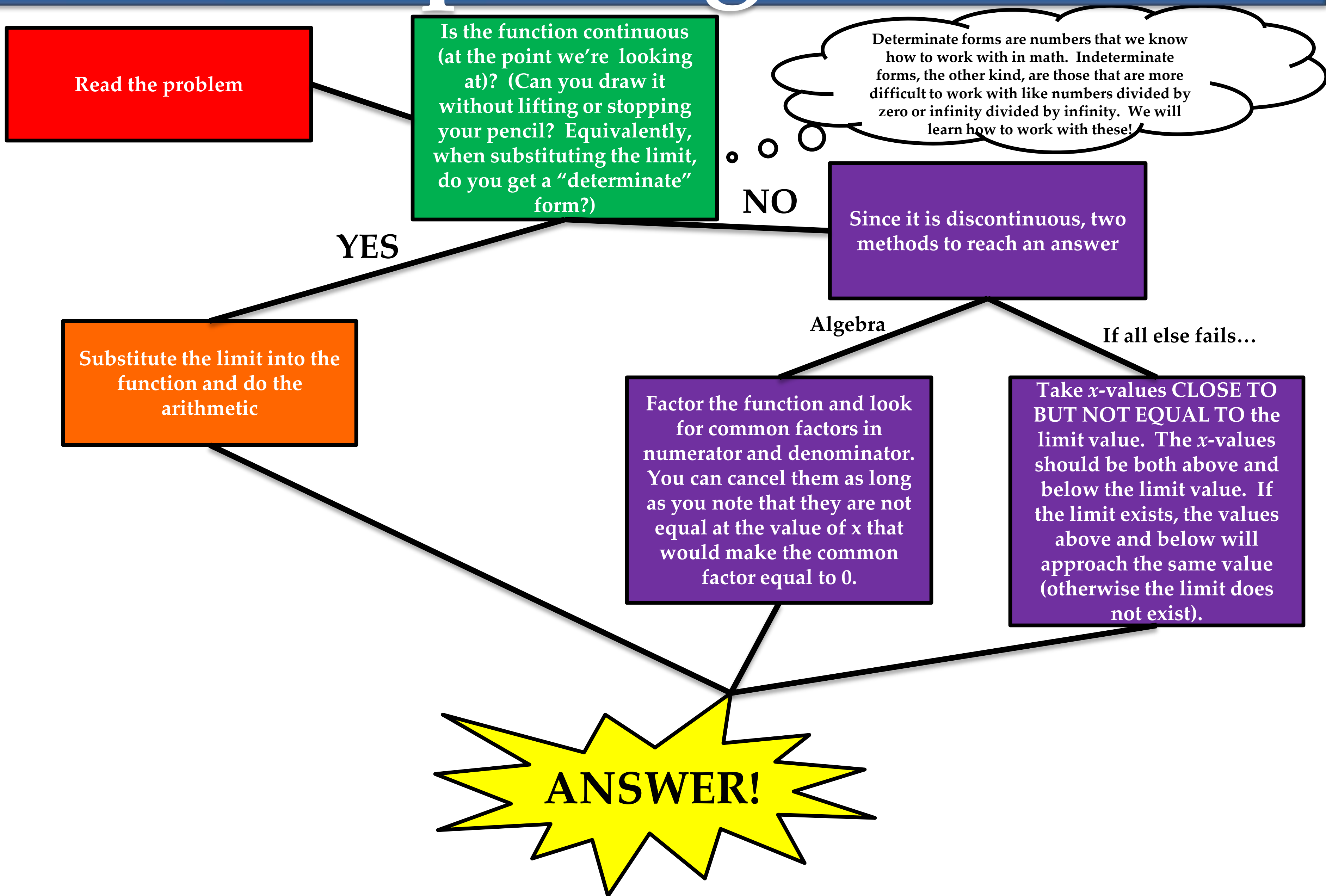
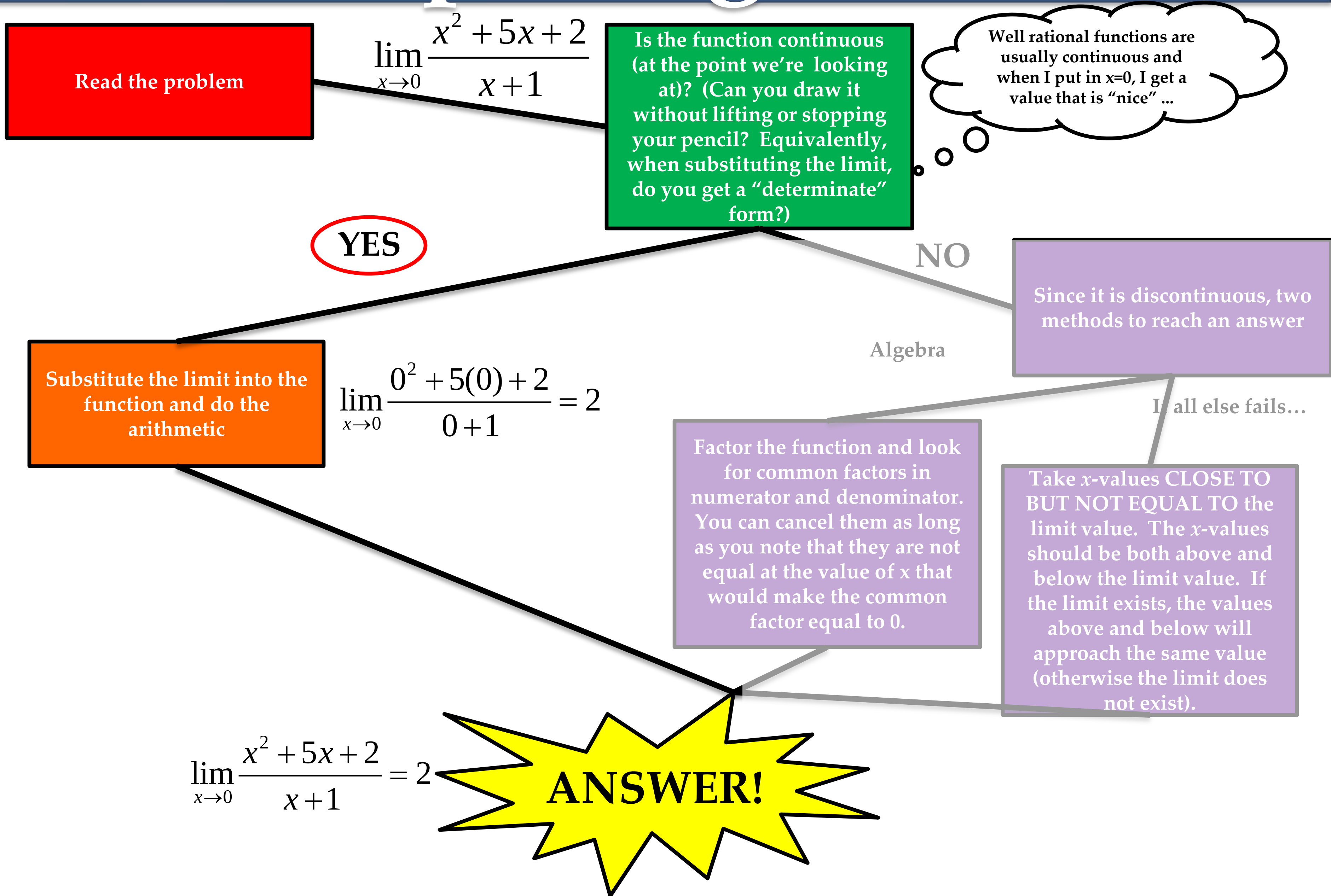
Computing Limits



Example 1

Computing Limits



Example 2

Computing Limits

Read the problem

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

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

Substitute the limit into the function and do the arithmetic

NO

Since it is discontinuous, two methods to reach an answer

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.

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

Algebra

if $x\neq -2$,

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

If all else fails…

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!

$$\lim_{x\to -2}\frac{x^2+8x+12}{x^2-4}=-1$$

Example 2
…again

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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!