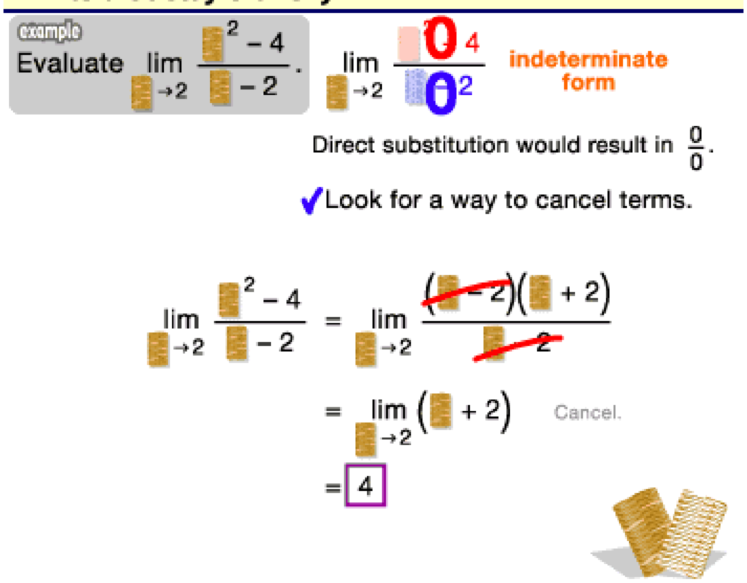
Unit: Limits **Module:** Evaluating Limits

An Overview of Limits

key concepts:

- The **limit** is the range value that a function approaches as you get closer to a particular domain value.
- An **indeterminate form** is a mathematically meaningless expression.

Limits that stay crunchy in milk



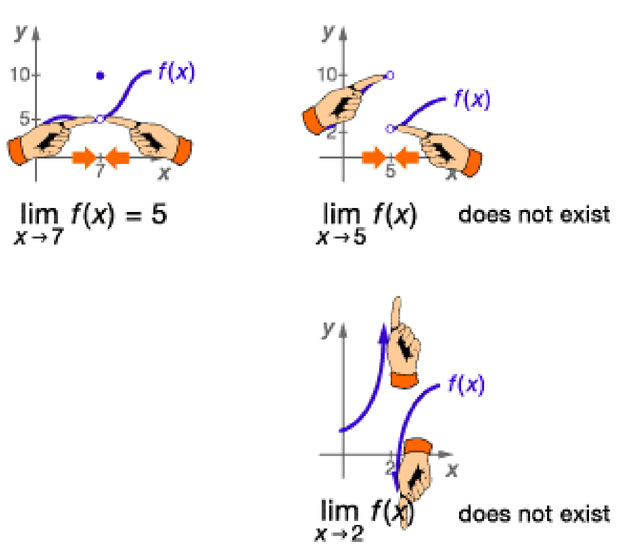
This **limit** involves an unusual variable.

Remember to use direct substitution as a first step in evaluating limits. In this case, direct substitution produces the familiar **indeterminate form** of 0/0.

Proceed by factoring the numerator, which is a difference of two squares.

Use cancellation to simplify the limit expression and then apply direct substitution to arrive at the result.

Existence of the limit



The existence of limits can be demonstrated graphically. On the far left, the graph shows that near $x = 7$ the function is approaching the same value from both the left and the right. The limit exists and equals that value, even though the function takes on a different value at $x = 7$.

On the near left, the graph approaches different values on either side of $x = 5$. Since the two one-sided limits have different values, the limit of the function does not exist.

Here is an example of a function that is approaching very large values from the one side and very small values from the other. Therefore the limit does not exist.