When we’re in CASE 2, meaning \( f(c) = \frac{\text{nonzero number}}{0} \), making a table is fine for the quiz, but time might be an issue. To determine analytically if the limit of \( f(x) \) as \( x \) approaches \( c \) exists, the main thing is to look at the denominator of the fraction you’re dealing with.

If the denominator has \((x - c)^n\) or \((c - x)^n\) and \( n \) is ODD, then the (overall) limit does not exist.

If you need to find the one-sided limits analytically, we have the following...

For the left limit, \((x - c)^n\) will be negative and \((c - x)^n\) will be positive.

For the right limit, \((x - c)^n\) will be positive and \((c - x)^n\) will be negative.

Then look at the signs in the numerator and the denominator to determine if the one-sided limit is positive or negative infinity.

If \( n \) is EVEN, then the limit exists, and you need to determine if the limit is infinity or negative infinity. First, figure out what the sign of the numerator is when \( x = c \). Because we're raising \((x - c)\) or \((c - x)\) to an EVEN power, it will always be positive. So, the sign (positive or negative) on infinity will match the sign of the numerator.