

Limits of Rational Functions: Substitution Method

A rational function is a function that can be written as the ratio of two algebraic expressions. If a function is considered rational and the denominator is not zero, the limit can be found by substitution. This can be seen in the example below (which is similar to the example #3 above, but now done in one quick, convenient step):

$$\lim_{x \rightarrow -1} \frac{x^3 + 4x^2 - 3}{x^2 + 5} = \frac{(-1)^3 + 4(-1)^2 - 3}{(-1)^2 + 5} = \frac{0}{6} = 0$$

This can be defined more formally as: If $P(x)$ and $Q(x)$ are algebraic expressions and $Q(c) \neq 0$, then:

$$\lim_{x \rightarrow c} \frac{P(x)}{Q(x)} = \frac{P(c)}{Q(c)}$$