

Math 150, Section 3.7

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Purpose of this section

In this section we learn how to solve inequalities involving rational functions by making sign chart.

Continuity and a Property of Continuity

Loosely speaking a **continuous** function is one which you can draw without lifting your pen from paper. Thus a continuous function will have no breaks. One property of continuous functions is that the function will maintain its sign between any two consecutive zeros. Thus we can study the signs of a continuous function by studying its zeros and the points where its not continuous.

Cut points

Cut points for a rational function are points where either the numerator is zero or the denominator is zero. For example the cut points of the function $f(x) = \frac{2(x-3)(x+4)}{x^2-1}$ are $x = -4, -1, 1$ and 3 .

When we are trying to solve inequalities involving rational functions we start off by finding cut points.

Steps to Solve a Rational Inequality

- ▶ Rewrite the inequality with 0 on the right hand side. Make sure not to divide or multiply the inequality with expressions which have undetermined sign.
- ▶ Find all the cut points of the rational function on the left hand side.
- ▶ List intervals determined by the cut points.
- ▶ Check the sign of the rational function on each of these intervals by picking a convenient point and plugging in to the rational function.
- ▶ Check whether the inequality is satisfied at the cut points.
- ▶ Combine last two steps to conclude.