Solving Rational Function Inequalities

A rational function $f(x)$ is defined as the quotient $\frac{p(x)}{q(x)}$ where $p(x)$ and $q(x)$ are two polynomial functions such that $q(x) \neq 0$. The solutions to a rational function inequality can be obtained graphically using the same method as for normal inequalities. You can find the solutions by graphing each side of the inequalities as an individual function.

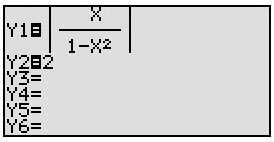
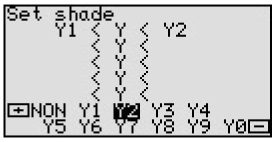
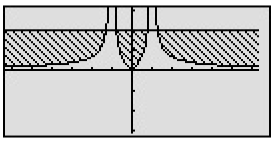
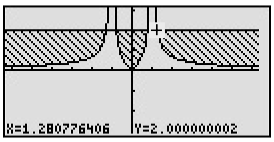
Example

Solve a rational inequality.

Solve $\left|\frac{x}{1 - x^2}\right| \leq 2$ by graphing each side of the inequality as an individual function.

Before Starting There may be differences in the results of calculations and graph plotting depending on the setting. Return all settings to the default value and delete all data.

Set the zoom to the decimal window: [ZOOM] [A]* ([ENTER] [ALPHA] [▼]*) [7]*

Step & Key Operation (When using EL-9650/9600c) *Use either pen touch or cursor to operate.	**Display** (When using EL-9650/9600c)	**Notes**
1 Enter $y = \left\|\frac{x}{1-x^2}\right\|$ for Y1. Enter $y = 2$ for Y2. [Y=] [MATH] [B]* [1]* [a/b] [X/θ/T/n] [▼]* [1] [—] [X/θ/T/n] [x^2] [ENTER]* [2]		
2 Set up the shading. [2nd F] [DRAW] [G]* [1]* [—] [▶]* [—] [—]*		Since Y1 is the value “on the bottom” (the smaller of the two) and Y2 is the function “on the top” (the larger of the two), Y1 < Y < Y2.
3 View the graph. [GRAPH]		
4 Find the intersections, and solve the inequality. [2nd F] [CALC] [2]* Do this four times		The intersections are when x = -1.3, -0.8, 0.8, and 1.3. The solution is all values of x such that $x \leq -1.3$ or $-0.8 \leq x \leq 0.8$ or $x \geq 1.3$.

The EL-9650/9600c/9450/9400 allows the solution region of inequalities to be indicated visually using the Shade feature. Also, the points of intersections can be obtained easily.