Extension

Use after Lesson 8.6

Solve Rational Inequalities

TEKS 2A.10.C, 2A.10.E, 2A.10.F

GOAL Find solutions of rational inequalities.

In Lesson 8.6, you solved rational equations. You can also solve rational inequalities using tables, graphs, or algebraic methods.

EXAMPLE 1 Solve a rational inequality using a table

Use a table to solve $\frac{x^2 - 2x + 1}{x - 2} > x$.

Solution

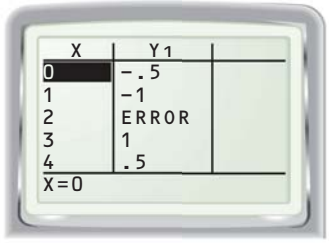
Subtract x from each side of the inequality so that 0 is on one side.

$$\frac{x^2 - 2x + 1}{x - 2} - x > 0$$ **Subtract x from each side.**

Enter $y = \frac{x^2 - 2x + 1}{x - 2} - x$ into a graphing calculator.

Use the *table* feature to find values of x for which y is positive.

The value of y is undefined when $x = 2$ and appears to be positive when $x > 2$. Use a smaller step value for x to convince yourself of this.



▶ The solution is $x > 2$.

EXAMPLE 2 Solve a rational inequality by graphing

From 1990 to 2001, the number d (in thousands) of doctors in the United States can be modeled by the function $d = \frac{966t^2 + 50{,}300}{t^2 + 79.7}$ where t is the number of years since 1990. When were there fewer than 800,000 doctors?

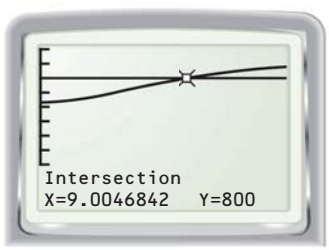
Solution

The problem requires solving this inequality:

$$\frac{966t^2 + 50{,}300}{t^2 + 79.7} < 800$$

Enter $y_1 = \frac{966x^2 + 50{,}300}{x^2 + 79.7}$ and $y_2 = 800$ into a graphing calculator.

Graph the functions and use the *intersect* feature. The graph of y_1 lies below the graph of y_2 when $0 \le x \le 9$.



▶ In the years 1990–1999, there were fewer than 800,000 doctors.