Graphing Technology Lab

Simplifying Rational Expressions

TI-Nspire

When simplifying rational expressions, you can use **TI-Nspire** technology to support your answer. If the graphs of the original expression and the simplified expression overlap, they are equivalent. You can also use the graphs to see excluded values.

ACTIVITY Simplify a Rational Expression

Simplify $\frac{x^2 - 16}{x^2 + 8x + 16}$.

Step 1 Factor the numerator and denominator.

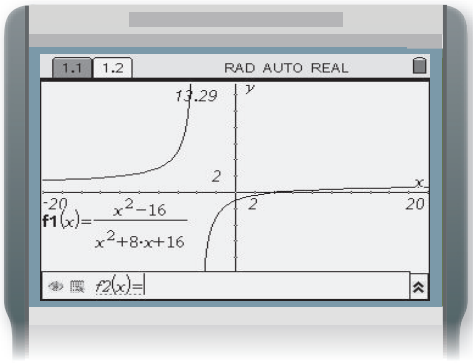
$$\frac{x^2 - 16}{x^2 + 8x + 16} = \frac{(x - 4)(x + 4)}{(x + 4)(x + 4)}$$
$$= \frac{(x - 4)}{(x + 4)}$$

When $x = -4$, $x + 4 = 0$. Therefore, x cannot equal -4 because you cannot divide by zero.

Step 2 Graph the original expression.

- Enter $\frac{x^2 - 16}{x^2 + 8x + 16}$ as **f1(x)** and graph.

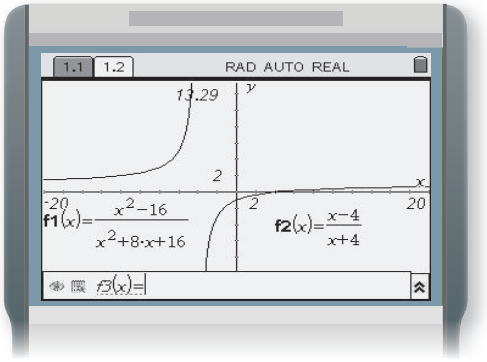
KEYSTROKES: (home) 6: New Document 2: Add Graphs & Geometry (X x^2 (−) 1 6) ÷ (X x^2 + 8 X + 1 6) enter (menu) 4: Window 1: Window Settings (ans) 2 0 (tab) 2 0 enter



Step 3 Graph the simplified expression.

- Enter $\frac{(x - 4)}{(x + 4)}$ as **f2(x)** and graph.

KEYSTROKES: (tab) (X (−) 4) ÷ (X + 4) enter



Since the graphs overlap, the two expressions are equivalent.

Exercises

Simplify each expression. Then verify your answer graphically. Name the excluded values.

1. $\frac{5x + 15}{x^2 + 10x + 21}$

2. $\frac{x^2 - 8x + 12}{x^2 + 7x - 18}$

3. $\frac{2x^2 + 6x + 4}{3x^2 + 9x + 6}$

4. a. Simplify $\frac{3x - 8}{6x^2 - 16x}$.

b. How can you use the **Table** function ((menu) 2: View 9: Add Function Table) to verify that the original expression and the simplified expression are equivalent?

c. How does the **Table** function show you that an x-value is an excluded value?