ACTIVITY 11.8

Using Technology

Graphing Rational Functions

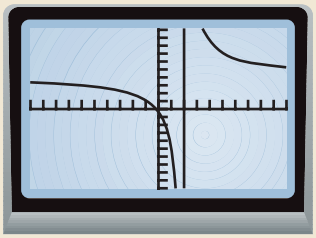
QUESTION **How can you use a graphing calculator or computer to recognize input values that are not in the domain of a rational function?**

EXPLORING THE CONCEPT

1 Simplify the right-hand side of the equation by factoring the numerator and denominator, and dividing out common factors.

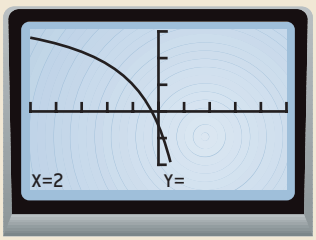
$$y = \frac{4x^2 + 9x + 2}{x^2 - 4}$$

2 Graph the simplified form of the function. Your calculator may show a vertical line at $x = 2$. This is *not* part of the graph. Some calculators draw this line in an attempt to connect the two branches of the graph.



3 Graph the original function in the same viewing rectangle as the simplified form. If you have simplified correctly, the graphs will look identical.

4 To check for undefined values, press ZOOM and choose *Decimal*. Then use the trace feature to find x-values for which no y-values appear in the viewing rectangle. These are the undefined values of the expression.



5 Do the original function and the simplified function have the same domain? Explain.

STUDENT HELP

INTERNET KEYSTROKE HELP

See keystrokes for several models of calculators at www.mcdougallittell.com

DRAWING CONCLUSIONS

In Exercises 1–6, simplify the right-hand side of the rational function. Then use a graphing calculator or computer to check your answer. Give the domain of the original function and of the simplified function.

1. $y = \dfrac{3x^2 - 13x - 10}{x^2 - 25}$

2. $y = \dfrac{x^2 - 6x + 8}{x^2 - 2x - 8}$

3. $y = \dfrac{2x^2 + 9x + 4}{x^2 + x - 12}$

4. $y = \dfrac{x^2 - x - 20}{x^2 - 16}$

5. $y = \dfrac{2x^2 - 3x - 9}{x^2 - 2x - 3}$

6. $y = \dfrac{2x^2 - 5x - 3}{x^2 - 8x + 15}$

7. CRITICAL THINKING Are the functions $y = \dfrac{x - 1}{(x + 3)(x - 1)}$ and $y = \dfrac{1}{x + 3}$ equivalent? Explain your reasoning.