Assignment

Write

1. Write a definition for each term.
   a. discontinuous function
   b. removable discontinuity

Remember

The graphs of rational functions have either a removable discontinuity or a vertical asymptote for all domain values that result in division by 0.

Holes are created in the graphs of rational functions when a common factor divides out of the numerator and denominator of the function.

Practice

1. Consider the rational function $f(x) = \frac{x - 4}{x^2 - 4x}$.
   a. Determine any vertical and horizontal asymptotes and any removable discontinuities of the graph of $f(x)$. Explain your reasoning.
   b. Sketch the graph of $f(x)$ without a calculator. Explain your reasoning.
2. Write a function $g(x)$ with a vertical asymptote $x = -5$ and removable discontinuities at $x = 0$ and $x = -3$. Explain your reasoning. Explain how to sketch the graph of the function $g(x)$ without using a calculator.
3. Write a function $h(x)$ with no vertical asymptotes and with removable discontinuities at $x = -2$ and $x = 6$. Explain your reasoning. Explain how to sketch the graph of the function $h(x)$ without using a calculator.
4. Explain how to sketch the graph of $m(x) = \frac{-x^2 + 2x + 35}{x^2 - 2x - 35}$ without using a calculator.

Stretch

1. Consider the rational function $f(x) = \frac{4x^3 + 8x^2 - 20x - 24}{x^4 - 2x^3 - 13x^2 + 14x + 24}$.
   a. Determine any vertical and horizontal asymptotes and any removable discontinuities of the graph of $f(x)$. Explain your reasoning.
   b. Sketch the graph of $f(x)$ without a calculator. Explain your reasoning.

Review

1. Write a rational function with vertical asymptotes $x = -2$ and 2 and a horizontal asymptote $y = 4$. Sketch the function on the given coordinate plane.
2. Consider the basic rational function $f(x) = \frac{1}{x}$. Explain how the graph of $h(x) = \frac{1}{x - 2} - 6$ compares to the graph of $f(x)$.
3. Expand $(-3x + 4y)^5$.
4. Determine the coefficient of a^7b^5 in the expansion of $(2a - 3b)^{12}$.