

Assignment

Write

Explain how the A -, B -, C -, and D -values of the transformation of the rational function $f(x) = \frac{1}{x}$ affect the horizontal and vertical asymptotes of the function.

Remember

Translations of a rational function $f(x)$ are given in the form $g(x) = Af(B(x - C)) + D$, where the D -value translates $f(x)$ vertically, and the C -value translates $f(x)$ horizontally.

Dilations of a rational function $f(x)$ are given in the form $g(x) = Af(B(x - C)) + D$, where the A -value vertically stretches $f(x)$ and the B -value horizontally stretches $f(x)$.

Practice

- Consider the functions $f(x) = x^2 + x - 6$ and $g(x) = \frac{1}{x^2 + x - 6}$.
 - Graph and label the function $f(x) = x^2 + x - 6$ on the given coordinate plane.
 - Graph and label the function $g(x) = \frac{1}{x^2 + x - 6}$ on the same coordinate plane.
 - Determine the domain, range, vertical asymptote(s), horizontal asymptote(s), and y -intercept of $g(x)$.
 - How do the output values of $f(x)$ and $g(x)$ compare for any given input value?
- Write a rational function with vertical asymptotes $x = 0$ and $x = 6$ and a horizontal asymptote $y = -2$. Sketch the function on the given coordinate plane.
- Consider the basic rational function $f(x) = \frac{1}{x}$. Explain how the graph of each new function compares to the graph of $f(x)$.
 - $g(x) = f(x + 5) - 9$
 - $h(x) = \frac{10}{x} + 8$
 - $m(x) = \frac{4}{x - 7} - 1$

Stretch

- Consider the functions $f(x) = x^2 - x - 12$ and $g(x) = x - 4$.
 - Create the rational function $h(x) = \frac{f(x)}{g(x)}$. Complete the table of values for the function $h(x)$ and then sketch the function.

x	-6	-4	0	4	6
$h(x)$					

- Does the sketch include any vertical asymptotes? Why or why not? Use algebra to explain.

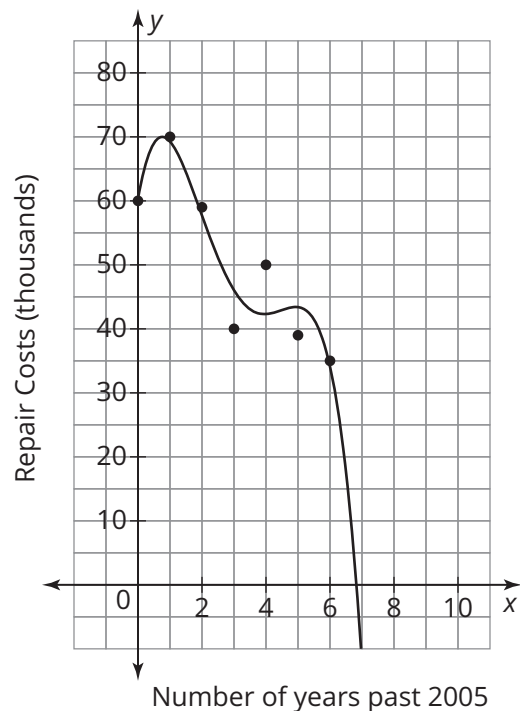
- c. Create the rational function $m(x) = \frac{g(x)}{f(x)}$. Complete the table of values for the function $h(x)$ and then sketch the function.

x	-5	-4	-3	-2	4	6
$m(x)$						

- d. Does the sketch include any vertical asymptotes? Why or why not? Use algebra to explain.
 e. If $f(x)$ and $g(x)$ are polynomials, are the vertical asymptotes of the rational function $R(x) = \frac{f(x)}{g(x)}$ always going to be the zeros of the function $g(x)$? Explain.

Review

- Consider the function $f(x) = \frac{2}{x}$.
 - Graph the function.
 - Analyze the function and the corresponding table and graph. Describe the domain, range, and end behavior of the function. Determine all of the asymptotes of the function. Explain your reasoning.
- The graph shows the amount of money spent by a town on road repairs over a 6 year period. The dots represent the actual data and the curve represents the quartic regression equation that best fits the data. Would you use the regression equation to make a prediction about how much the town spent in 2012? Explain your reasoning.



- Macy measures the side lengths of a triangular piece of metal. The side lengths are 44 cm, 117 cm, and 125 cm.
 - Verify that the triangular piece of metal is a right triangle.
 - Use Euclid's Formula to determine the positive integers r and s , where $r > s$, that will generate these three side lengths.