

Rational Functions

Determine the vertical asymptote(s) of the graph of the following functions.

1. $f(x) = \frac{x^3 + x^2 - 2x}{x^2 - 9}$

2. $h(x) = \frac{4}{x^2 - x}$

3. $q(x) = \frac{x^2 - 3x}{x^3 + 2x^2 - 15x}$

4. $r(x) = \frac{x^2 - 4}{x^2 - 4x + 4}$

Determine the hole(s) of the graph of the following functions.

1. $f(x) = \frac{x^3 + x^2 - 2x}{x^2 - 9}$

2. $h(x) = \frac{4}{x^2 - x}$

3. $q(x) = \frac{x^2 - 3x}{x^3 + 2x^2 - 15x}$

4. $r(x) = \frac{x^2 - 4}{x^2 - 4x + 4}$

Determine the horizontal asymptote(s) of the graph of the following functions.

1. $f(x) = \frac{2x^3 - x}{5x^3 - 2x^2 + 1}$

2. $g(x) = \frac{(x - 1)(x + 2)}{x(x + 1)(x - 3)}$

3. $h(x) = \frac{3x^3 - x + 5}{250x^2 + 60x}$

For the following functions, find all zeros, vertical asymptotes, holes, and horizontal asymptotes. Then, sketch the graph of the function, labeling any horizontal and vertical asymptotes and axis intercepts. Hint: plotting several points may help in addition to the information above.

1. $g(x) = \frac{5}{3-x}$

$$2. f(x) = \frac{3x(x-1)}{x^2+x-2}$$