

3.49
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## Rational Functions

$$f(x) = \frac{1}{x}$$

Domain.

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

vertical asymptote.

$$h(x) = \frac{-1}{x+2}$$

horizontal asymptote.  
← non-vertical

$$f(x) = \frac{1}{x(x+2)}$$

sign diagram.

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

root.

$$h(x) = \frac{(x+1)(x-1)}{x(x+2)}$$

horizontal asymptote.  
← non-vertical

$$f(x) = \frac{x}{x}$$

hole.

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

hole

3.4A  
2/2

$$h(x) = \frac{3x^2 - 12}{x^2 + 2x - 3}$$

non-vertical w/ poly long div.

$$x^2 + 2x - 3 \overline{) 3x^2 + 0x - 12}$$

full graph.

$$\rightarrow f(x) = \frac{x^2 - 3x - 4}{x - 2}$$

oblique non-vertical asymptote.

non-vertical asymptotes: 3 cases.

$$g(x) = \frac{n(x)}{d(x)} = \frac{a_n x^n + \dots + a_1 x + a_0}{b_m x^m + \dots + b_1 x + b_0}$$

case 1:  $m > n$ case 2:  $m = n$ case 3:  $n > m$ .

$$\rightarrow g(x) = \frac{x^2 + x - 2}{2x - 4}$$

oblique asymptote.

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

hole

$$f(x) = \frac{6}{x^2 - x - 6}$$

range.

3.4b 1/2
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## Rational Functions.

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

min & max calculator commands.

$$h(x) = \frac{(x+1)(x-1)}{x(x+2)}$$

horizontal asymptote.

$$f(x) = \frac{x}{x}$$

hole.

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

hole.