

5.2, 5.3 Functions - Domain, Range
Asymptotes
Intercepts
Graph

Proper Rational Expression

$$\frac{x-3}{x^2-4}$$

$$\frac{x^2-4}{x}$$

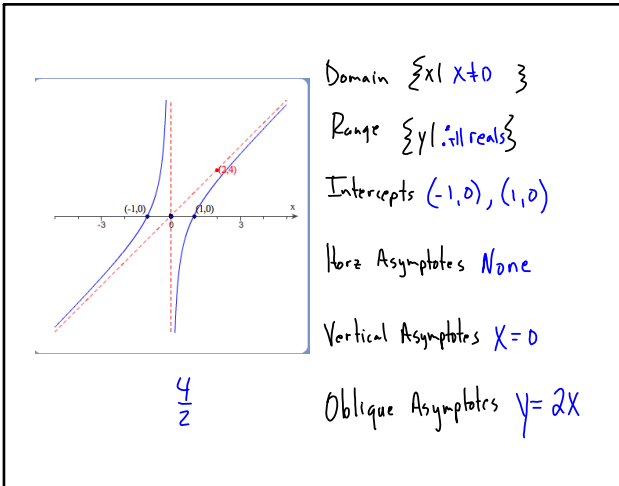
$$R(x) = \frac{5x}{x+19}$$

Domain

$$\{x \mid x \neq -19\}$$

or

$$(-\infty, -19) \cup (-19, \infty)$$



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

Domain $\{x \mid x \neq -2\}$

Range $\{y \mid y \neq 0\}$

Smaller degree on Top

Horz $y=0$
Asym.

Degree equal Top/Bottom:

$y = \frac{a}{b}$ divide leading Coeff.

Degree Top Bigger

Then it is Oblique Asym.

Vert. Asymptotes $x=-2$

Horz. Asymptotes $y=0$

Oblique "None"

Horizontal Asym.

Degree $\begin{matrix} \text{Top} \\ < \\ \text{Bottom} \end{matrix} =$

Degree $\begin{matrix} \text{Top Less} \\ < \\ \text{Bottom} \end{matrix}$

$$f(x) = \frac{1x^2}{2x^2-7}$$

$$y = \frac{1}{2}$$

$$f(x) = \frac{x^1}{2x^2-7}$$

$$y = 0$$

Oblique

Degree on Top > Bottom

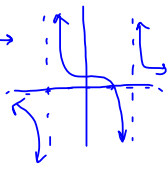
$$h(x) = \frac{x^3-8}{x^2-36}$$

$$x^2-36 \overline{) x^3-8}$$

Oblique

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$$F(x) = \frac{x^2-7x-8}{x+10}$$

Can the graph of the function
 Cross vertical Asymptotes **No**
 Cross horizontal **yes** → 
 Cross Oblique **No**

$$Q(x) = \frac{2x^2 - 5x - 3}{5x^2 - 14x - 3}$$

Vert. Asym. $x = 3$
 $x = -\frac{1}{5}$

Horz. Asym. $y = \frac{2}{5}$

Oblique Asym. **No**

$$5x^2 - 14x - 3 = 0 \quad \begin{matrix} 15 \\ \wedge \\ -15+1 \end{matrix}$$

$$5x^2 - 15x + x - 3 = 0$$

$$5x(x-3) + 1(x-3) = 0$$

$$(x-3)(5x+1) = 0$$

$$R(x) = \frac{x^2 + 2x - 15}{x - 5}$$

Domain $\{x \mid x \neq 5\}$

V. Asym. $x = 5$

Horz. or Oblique $y = x + 7$

$$x-5 \overline{) \begin{matrix} x^2 + 2x - 15 \\ \underline{x^2 - 5x} \\ 7x - 15 \end{matrix}}$$
