

Answer all the blanks and draw the graph.

1. $f(x) = \frac{2}{x+8}$

Domain: \mathbb{R} except $x = -8$

Range: \mathbb{R} except $y = 0$

Vertical Asymptote: $x = -8$

Horizontal Asymptote: $y = 0$

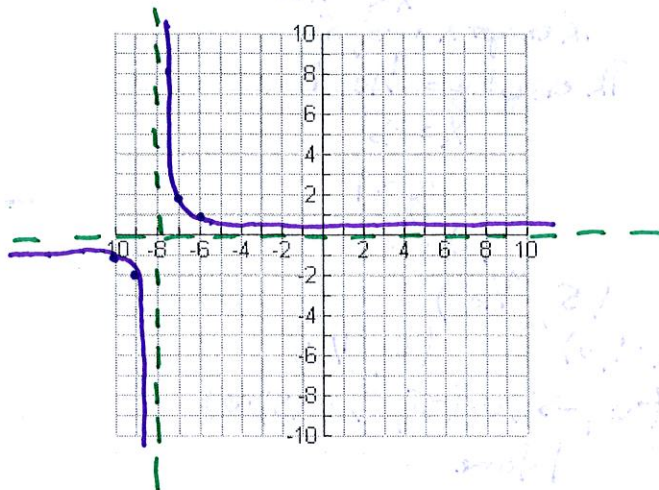
Slant Asymptote: None

Holes: None

x-int: None y-int: $(0, 1/4)$

INC: None

DEC: $(-\infty, -8) \cup (-8, \infty)$



2. $f(x) = \frac{2x^2 + 4x}{x^2 + 7x + 10}$ $\frac{2x(x+2)}{(x+2)(x+5)}$

Domain: \mathbb{R} except $x = -5, -2$

Range: \mathbb{R} except $y = -4/3, 2$

Vertical Asymptote: $x = -5$

Horizontal Asymptote: $y = 2$

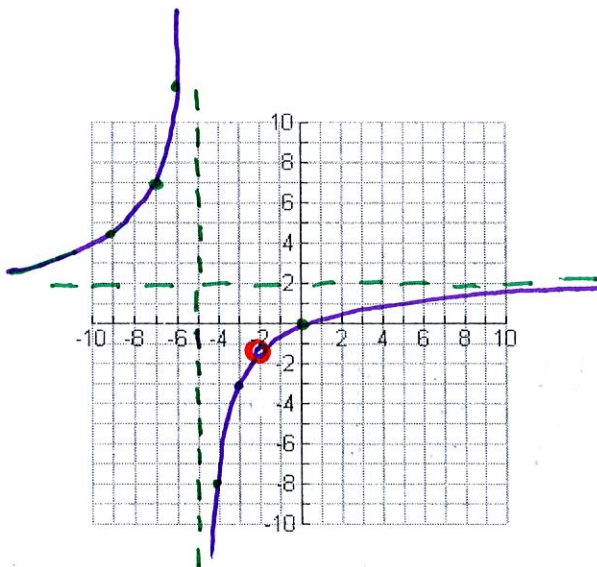
Slant Asymptote: None

Holes: $(-2, -4/3)$

x-int: $(0, 0)$ y-int: $(0, 0)$

INC: $(-\infty, -5) \cup (-5, -2) \cup (-2, \infty)$

DEC: None



3. $f(x) = \frac{x^2 - x - 6}{x - 2}$ $\frac{(x-3)(x+2)}{x-2}$

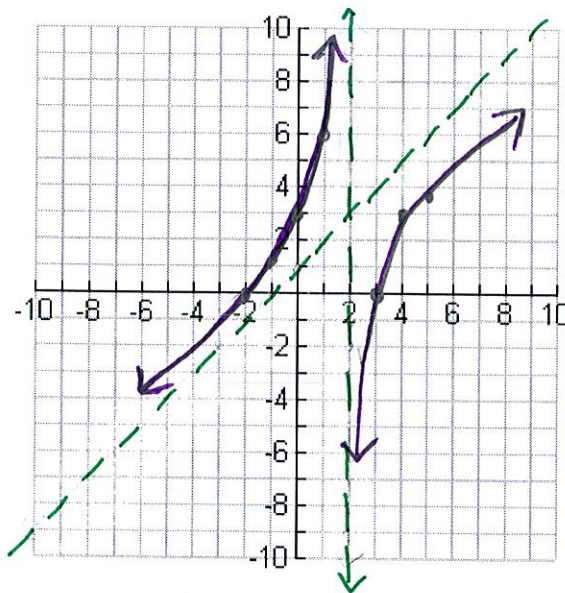
Vertical Asymptote: $x = 2$

Horizontal Asymptote: NONE

Slant Asymptote: $y = x + 1$

Holes: NONE

x-int: $(3, 0) \cup (-2, 0)$ y-int: $(0, 3)$



x	y
-2	0
-1	1.3
0	3
1	6
3	0
4	3
5	4.6

$$\begin{array}{r|rrrr} 2 & 1 & -1 & -6 & \\ & \downarrow & 2 & & \\ \hline & 1 & 1 & & \end{array}$$



Rational Functions

4. $f(x) = \frac{x^2 - x - 20}{x^2 - 25}$

$\frac{x-5}{x+5} \cdot \frac{x+4}{x+5}$

Domain: \mathbb{R} except $x = -5, 5$

Range: \mathbb{R} except $y = \frac{9}{10}, 1$

Vertical Asymptote: $x = -5$

Horizontal Asymptote: $y = 1$

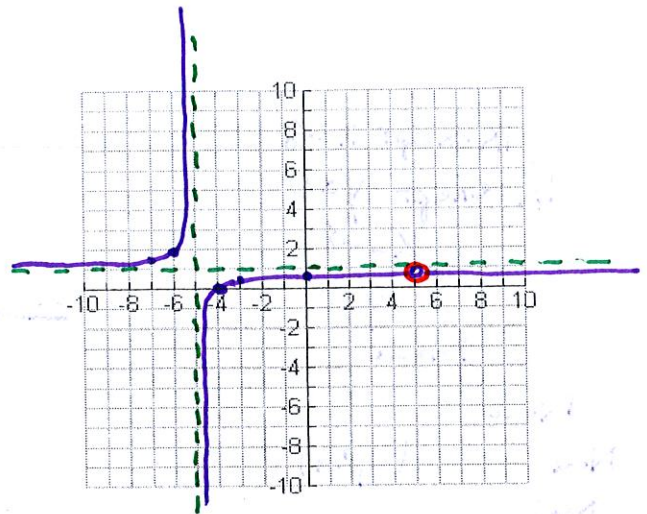
Slant Asymptote: None

Holes: $(5, \frac{9}{10})$

x-int: $(-4, 0)$ y-int: $(0, \frac{4}{5})$

INC: $(-\infty, -5) \cup (-5, 5) \cup (5, \infty)$

DEC: None



5. Can rational functions have Horizontal Asymptotes and Slant Asymptotes? **No**

6. Can rational functions have Horizontal Asymptotes and Vertical Asymptotes? **Yes**

7. Find all the Asymptotes of $g(x) = \frac{x^2 - 2x + 5}{x + 2}$

$$\begin{array}{r|rr} -2 & 1 & -2 & 5 \\ & & -2 & 8 \\ \hline & 1 & -4 & 13 \end{array}$$

VA: $x = -2$

HA: None

Slant: $y = x - 4$

8. What is the x-intercept and y-intercept for $h(x) = \frac{x - 3}{(x + 1)(x - 2)}$

x-int: $(3, 0)$

y-int: $(0, \frac{3}{2})$

9. Does $f(x) = \frac{x^2 - 3x - 10}{x^2 - 25}$ have a hole? **Yes**

$\frac{x-5}{x+5} \cdot \frac{x+2}{x+5}$

$\frac{x-5}{x+5}$

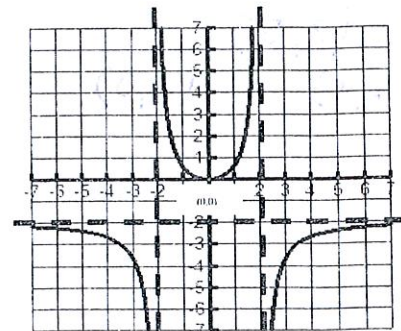
If so, what is the hole? $(5, \frac{7}{10})$

(include the y-value)

10. Find horizontal and vertical asymptotes of the rational function, Find the x and y intercepts

HA: $y = -2$ VA: $x = \pm 2$

x-int: $(0, 0)$ y-int: $(0, 0)$



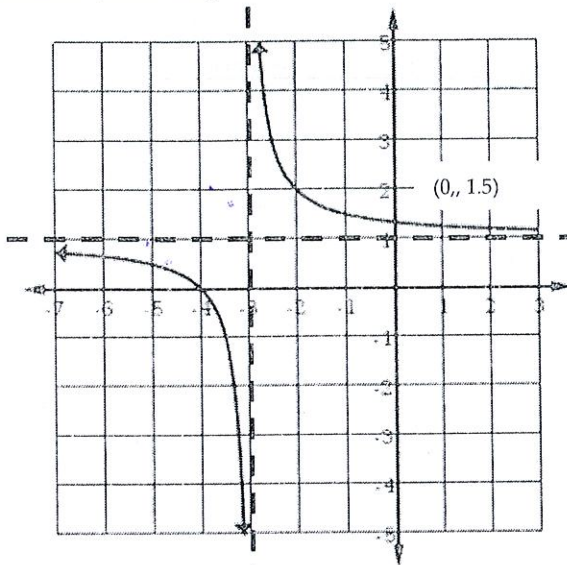
11. Find all asymptotes, x-intercepts, y-intercept, domain, and range

Asymptotes: $x = -3$ $y = 1$

x-int $(-4, 0)$ y-int $(0, 1.5)$

Domain: \mathbb{R} except $x = -3$

Range: \mathbb{R} except $y = 1$



12. Write a rational function with vertical asymptotes at $x = 2$ and $x = \frac{3}{2}$ and horizontal asymptote at $y = -2$.

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

13. Write a rational function with no vertical asymptote and a horizontal asymptote at $y = 0$.

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

14. Write a rational function with vertical asymptote at $x = -3$ and horizontal asymptote at $y = 2$.

$$f(x) = \frac{2x}{x+3}$$

15. Given $g(x) = \frac{x^2 - 16}{2x^2 - 8x}$, A. explain what is occurring at $x = 4$? B. What are the asymptotes?

a. Hole $(4, 1)$

b. VA: $x = 0$
HA: $y = \frac{1}{2}$



