

# Precalculus Unit 3 Homework—Graphing Rational Equations

For each function, use the points of discontinuity, holes, and asymptotes to sketch a graph. Determine the end behavior and behavior around asymptotes.

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

Hole(s): none

x-int(s): none

y-int: (0, -\frac{5}{2})

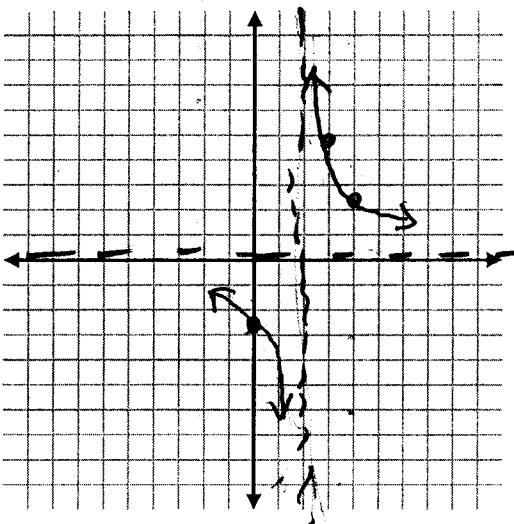
Equations of

ALL asymptotes: V.A. x=2 H.A. y=0

$$\lim_{x \rightarrow -\infty} f(x) = \underline{0} \quad \lim_{x \rightarrow \infty} f(x) = \underline{0}$$

$$\lim_{x \rightarrow 2^-} f(x) = \underline{-\infty} \quad \lim_{x \rightarrow 2^+} f(x) = \underline{\infty}$$

$$\lim_{x \rightarrow 0} f(x) = \underline{\text{DNE}} \quad \lim_{x \rightarrow 0} f(x) = \underline{-\frac{5}{2}}$$



x	y
3	$\frac{5}{3} = 1\frac{2}{3}$
4	$\frac{5}{4} = 1\frac{1}{4}$

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

Hole(s): none

x-int(s): none

y-int: (0, \frac{7}{5})

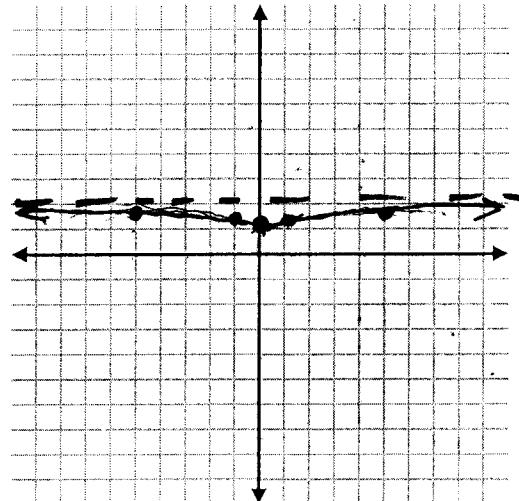
Equations of

ALL asymptotes: H.A. y=2

$$\lim_{x \rightarrow -\infty} f(x) = \underline{2} \quad \lim_{x \rightarrow \infty} f(x) = \underline{2}$$

$$\lim_{x \rightarrow 0^-} f(x) = \underline{\frac{7}{5}} \quad \lim_{x \rightarrow 0^+} f(x) = \underline{\frac{7}{5}}$$

$$\lim_{x \rightarrow 0} f(x) = \underline{\frac{7}{5}}$$



x	y
5	1.9
1	1.5
-1	1.5
-5	1.9

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

Hole(s): none

x-int(s): (0,0)

y-int: (0,0)

Equations of

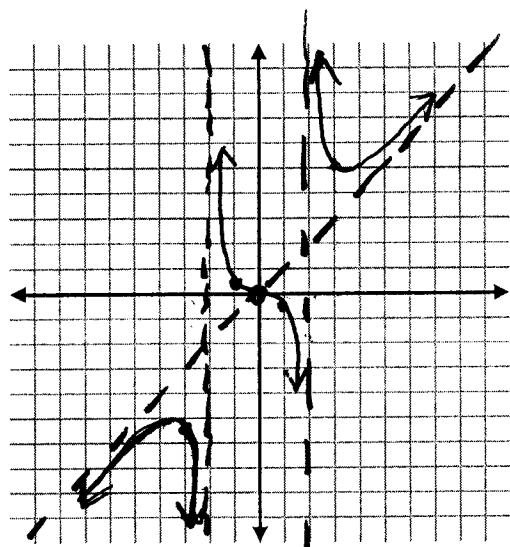
ALL asymptotes: V.A.  $x = -2, 2$   
oblique  $y = x$

$$\lim_{x \rightarrow -\infty} f(x) = \underline{-\infty} \quad \lim_{x \rightarrow \infty} f(x) = \underline{\infty}$$

$$\lim_{x \rightarrow -2^-} f(x) = \underline{-\infty}, \quad \lim_{x \rightarrow 2^-} f(x) = \underline{-\infty}$$

$$\lim_{x \rightarrow -2^+} f(x) = \underline{\infty}, \quad \lim_{x \rightarrow 2^+} f(x) = \underline{\infty}$$

$$\lim_{x \rightarrow -2} f(x) = \underline{DNE} \quad \lim_{x \rightarrow 2} f(x) = \underline{DNE}$$



$$\begin{array}{r} x^2 - 4 \\[-1ex] \overline{x^3} \end{array}$$

$$\begin{array}{r} x^3 \\[-1ex] -(x^3 - 4x) \\[-1ex] \hline 4x \end{array}$$

x	y
-3	$\frac{-27}{5}$
-1	$\frac{-1}{-3} = \frac{1}{3}$
1	$\frac{1}{-3} = -\frac{1}{3}$
3	$\frac{27}{5}$

$$4. f(x) = \frac{x-2}{x^2 - 2x - 8} = \frac{x-2}{(x-4)(x+2)}$$

Hole(s): none

x-int(s): (2,0)

y-int: (0,  $\frac{1}{4}$ )

Equations of

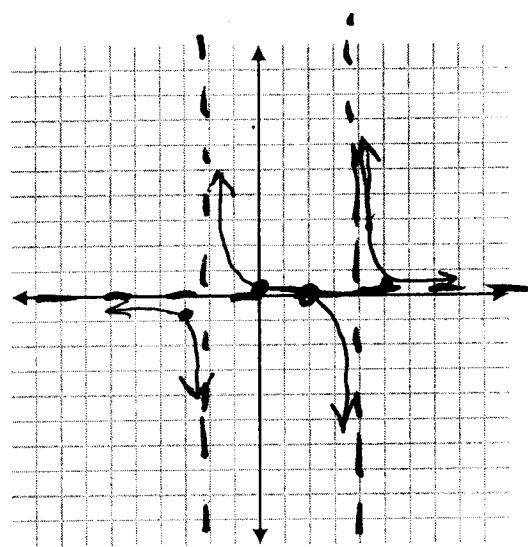
ALL asymptotes: V.A.  $x = 4, -2$   
H.A.  $y = 0$

$$\lim_{x \rightarrow -\infty} f(x) = \underline{0} \quad \lim_{x \rightarrow \infty} f(x) = \underline{0}$$

$$\lim_{x \rightarrow -2^-} f(x) = \underline{-\infty} \quad \lim_{x \rightarrow 4^+} f(x) = \underline{-\infty}$$

$$\lim_{x \rightarrow -2^+} f(x) = \underline{\infty} \quad \lim_{x \rightarrow 4^-} f(x) = \underline{\infty}$$

$$\lim_{x \rightarrow -2} f(x) = \underline{DNE} \quad \lim_{x \rightarrow 4} f(x) = \underline{DNE}$$



x	y
-3	$\frac{-5}{7}$
5	$\frac{3}{7}$

$$5. g(x) = \frac{x^2 - 5x - 6}{x^2 - x - 2} = \frac{(x-6)(x+1)}{(x-2)(x+1)} = \frac{x-6}{x-2}$$

$$6. f(x) = \frac{x+4}{-2x-6} = \frac{x+4}{-2(x+3)}$$

Hole(s):  $(-1, \frac{7}{3})$

$$f(-1) = \frac{-7}{-3} = \frac{7}{3}$$

x-int(s):  $(6, 0)$

y-int:  $(0, 3)$

Equations of

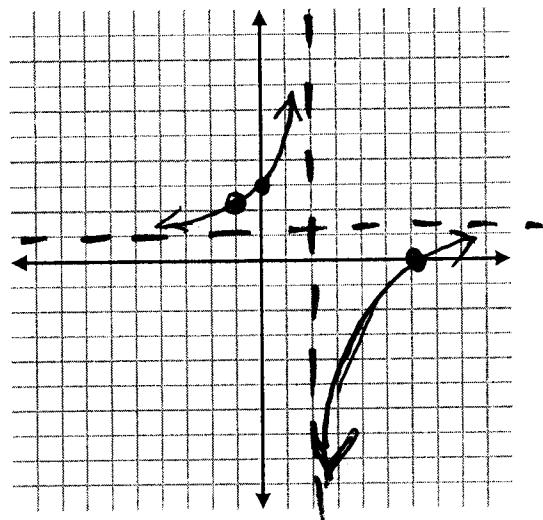
ALL asymptotes: V.A.  $x=2$   
H.A.  $y=1$

$$\lim_{x \rightarrow -\infty} f(x) = 1 \quad \lim_{x \rightarrow \infty} f(x) = 1$$

$$\lim_{x \rightarrow -1^-} f(x) = \frac{7}{3} \quad \lim_{x \rightarrow 2^-} f(x) = \infty$$

$$\lim_{x \rightarrow -1^+} f(x) = \frac{7}{3} \quad \lim_{x \rightarrow 2^+} f(x) = -\infty$$

$$\lim_{x \rightarrow -1} f(x) = \frac{7}{3} \quad \lim_{x \rightarrow 2} f(x) = \text{DNE}$$



Hole(s): none

x-int(s):  $(-4, 0)$

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

Equations of

ALL asymptotes: V.A.  $x=-3$   
H.A.  $y = -\frac{1}{2}$

$$\lim_{x \rightarrow -\infty} f(x) = -\frac{1}{2} \quad \lim_{x \rightarrow \infty} f(x) = -\frac{1}{2}$$

$$\lim_{x \rightarrow -3^-} f(x) = \infty \quad \lim_{x \rightarrow -3^+} f(x) = -\infty$$

$$\lim_{x \rightarrow -3} f(x) = \text{DNE}$$

