Example 1:

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

A. Look for symmetry. $\frac{4(-x)}{(-x)-2}$

Since the numerator changed signs completely, but the denominator half changed there is no symmetry.

B. Find y-intercepts, if any. $f(x) = \frac{4(0)}{0-2} = \frac{0}{2} = 0$

The y-intercept is (0,0).

C. Find any x-intercepts. 0=4x 0=x

(0,0) is our x-intercept as well.

D. Find vertical asymptote(s). x-2=0

So x=2 is the vertical asymptote.

E. Find horizontal asymptote(s). 1=1

The asymptote is the ratio of 4/1, so the asymptote is y=4.

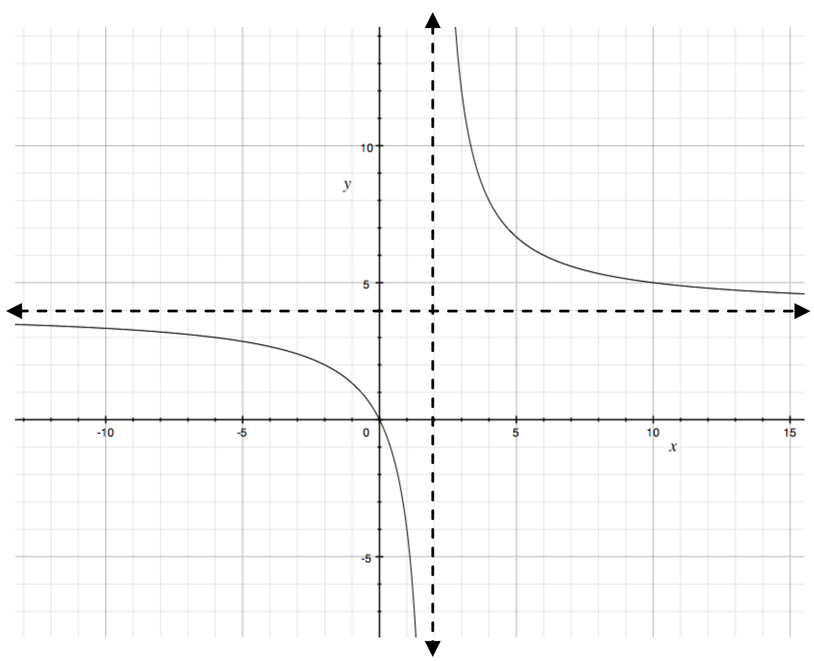
F. Find slant asymptote, if any. 1=1

Since the degrees are the same, there is no slant asymptote.

G & H. Find points and graph.

Found points:

(1, -4)
(3, 12)
(-1, 4/3)



<u>Example 2:</u>

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

A. Look for symmetry. $\frac{2(-x)}{(-x)^2-4} = \frac{-2x}{x^2-4} = -\left(\frac{2x}{x^2-4}\right)$

Since the numerator changed signs completely, but the denominator stayed the same, causing the function to become –f(x), there is odd symmetry.

B. Find y-intercepts, if any. $\frac{2(0)}{(0)^2-4} = \frac{0}{-4} = 0$

(0,0) is the y-intercept.

C. Find any x-intercepts. $\frac{0}{2} = \frac{2x}{2}$ 0=x

(0,0) is also the x-intercept.

D. Find vertical asymptote(s).

$x^2 - 4 = 0$

$x^2 = 4$

$\sqrt{x^2} = \pm\sqrt{4}$

X = ±2

X=-2 (-2,0) and x=2 (2,0) are both vertical asymptotes.

E. Find horizontal asymptote(s). 1<2

Y=0 is the horizontal asymptote.

F. Find slant asymptote, if any. 1<2

Since the numerator degree is smaller than the denominator degree, there is no slant asymptote.

G & H. Find points and graph.

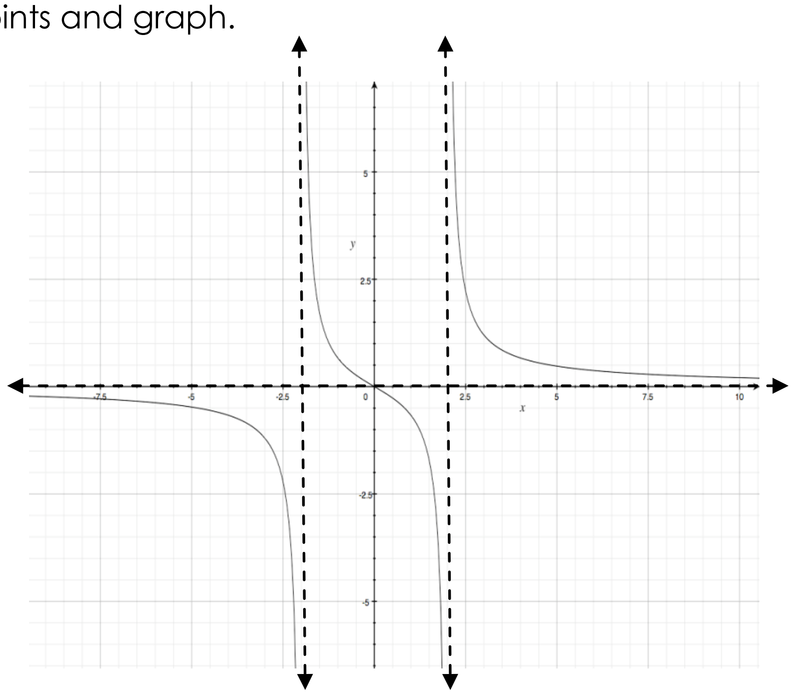
Found points:

(-1, 2/3)

(1, -2/3)

(3, 1.2)

(-3, -1.2)



Example 3:

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

A. Look for symmetry. $\frac{(-x)^2-1}{(-x)} = \frac{x^2-1}{-x} = -\left(\frac{x^2-1}{x}\right)$

Since the denominator changed signs completely, but the numerator stayed the same, causing the function to become –f(x), there is odd symmetry.

B. Find y-intercepts, if any. $\frac{0^2-1}{0} = \frac{-1}{0}$

This is undefined so that means there is no y-intercept.

C. Find any x-intercepts.

$x^2 - 1 = 0$

$x^2 = 1$

$\sqrt{x^2} = \pm\sqrt{1}$

X= ±1

X=-1 (-1,0) and x=1 (1,0) are both vertical asymptotes.

D. Find vertical asymptote(s). x=0

X=0 is our vertical asymptote.

E. Find horizontal asymptote(s). 2>1

Because the numerator degree is one more than then denominator degree, there is no horizontal asymptote.

F. Find slant asymptote, if any. 2>1

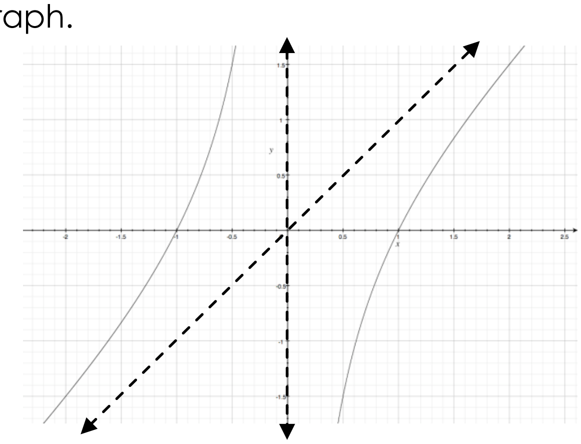
Yes there is a slant asymptote.

$$\begin{array}{r} X \\ x\overline{)x^2 + 0x - 1} \\ -x^2 \\ -1 \end{array}$$

y=x is the slant asymptote

G & H. Find points and graph.

(1.5, 0.83) & (-1.5, -0.83)



Example 4:

$$f(x) = \frac{x^2-2x-3}{x^2-8x+15} \qquad \frac{(x-3)(x+1)}{(x-3)(x-5)}$$

A. Look for symmetry. $\frac{(-x)^2-2(-x)-3}{(-x)^2-8(-x)+15} = \frac{x^2+2x-3}{x^2+8x-15}$

Since both the numerator and the denominator half changed, there is no symmetry.

B. Find y-intercepts, if any. $\frac{(0)^2-2(0)-3}{(0)^2-8(0)+15} = \frac{-3}{15} = -\frac{1}{5}$

(0, -1/5) is the y-intercept.

C. Find any x-intercepts. X+1=0

X=-1

Since(x-3) cancels away, it is not an x-intercept.

X=-1 (-1,0) is the x-intercept.

D. Find vertical asymptote(s). $\frac{(x-3)(x+1)}{(x-3)(x-5)}$

x-3=0 x-5=0

x=3 x=5

Because (x-3) is in both the denominator and the numerator it can cancel out, creating a hole at x=3. At x=5 there is a vertical asymptote.

E. Find horizontal asymptote(s). 2=2

The asymptote is the ratio of 1/1, so the asymptote is y=1.

F. Find slant asymptote, if any. 2=2

Since the degrees are the same, there is no slant asymptote.

G & H. Find points and graph.

Found point:

(6, 7)