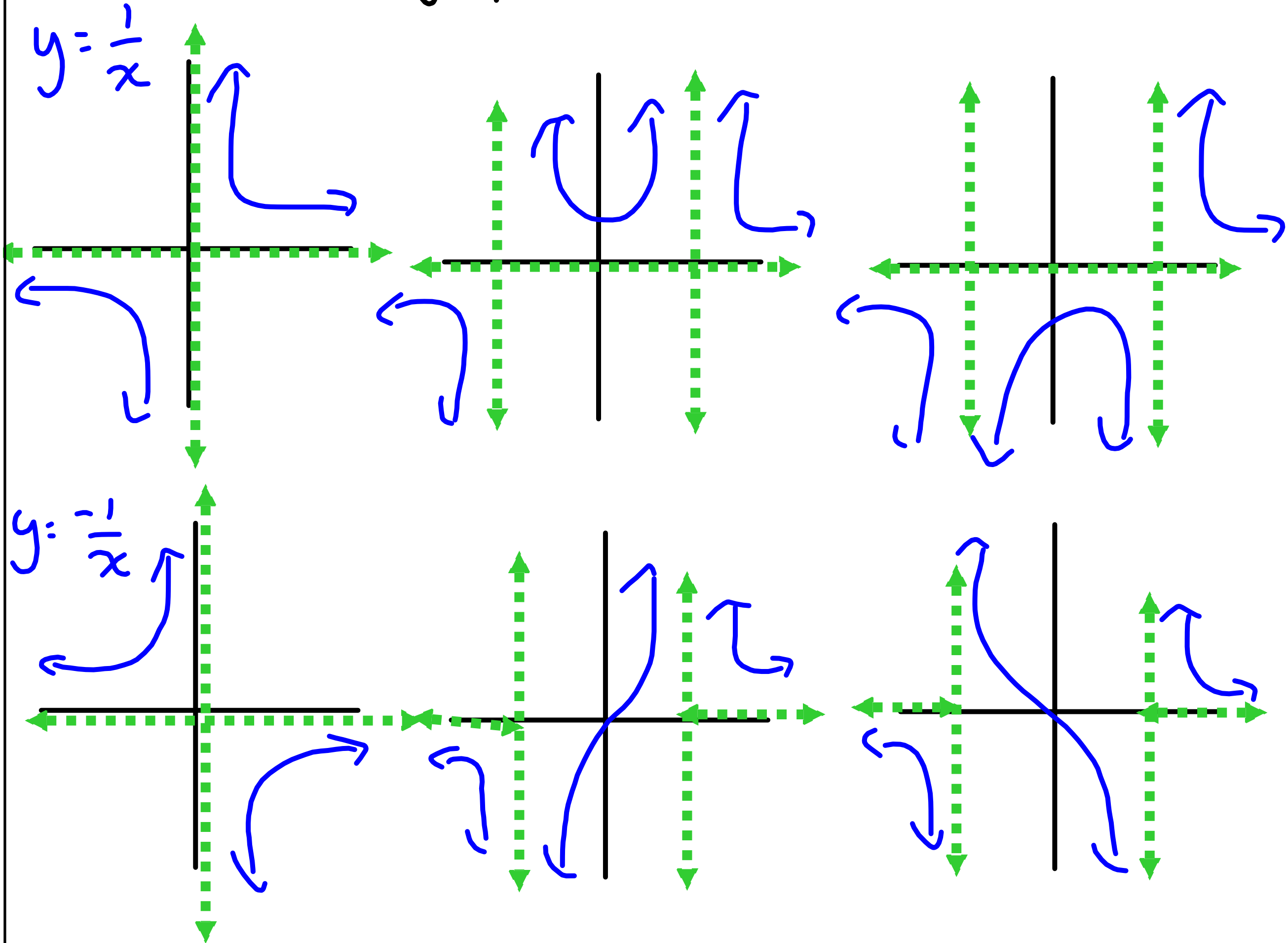
What can the graphs look like?



$$f(x)=\frac{x^2+4x}{4x^2-16}$$

$x^2+4x \leftarrow$ GCF

$4x^2-16 \leftarrow$ ~~Perfect square~~

$\nwarrow$ GCF

$$\frac{x(x+4)}{\cancel{(2x-4)(2x+4)}}$$

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

$4(x^2-4)$

$4(x-2)(x+2)$

cancel out $\Rightarrow$ nothing $\Rightarrow$ no holes

denom = 0 $\quad 4(x-2)(x+2)=0 \quad \Rightarrow$ VA "vertical asymptote"

$$\frac{\cancel{4}(x-2)(x+2)}{\cancel{4}}=\frac{0}{4}$$

$x=-2 \quad x=2$

$(x-2)(x+2)=0$

$x-2=0 \quad x+2=0$

$x=2 \quad x=-2$

Horizontal Asymptote Rules

1) largest degree on top $\dfrac{x^3\ldots}{x\ldots}$

slant

2) largest degree on bottom $\dfrac{x\ldots}{x^2\ldots}$

$y=0$

3) same degree top & bottom $\dfrac{\boxed{3}x^2\ldots}{\boxed{5}x^2\ldots}$

coefficients of highest degrees $\quad y=\frac{3}{5}$

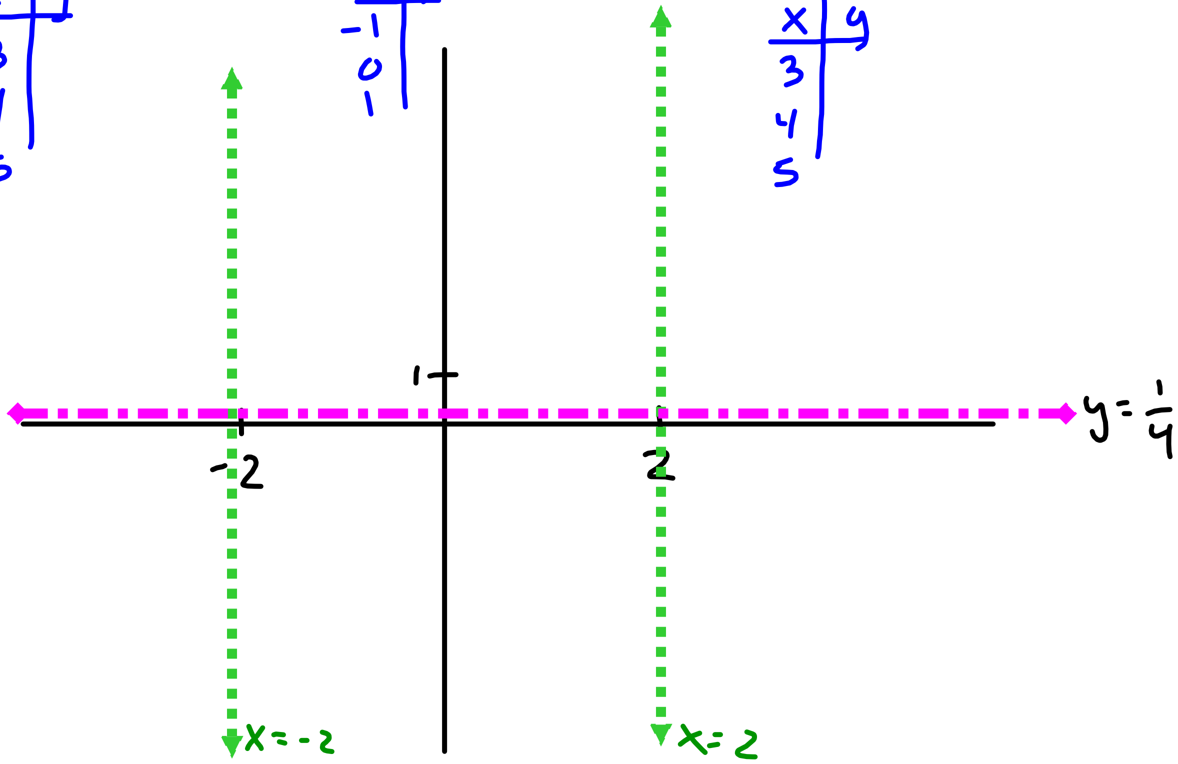
$$\frac{x^2}{4x^2}$$

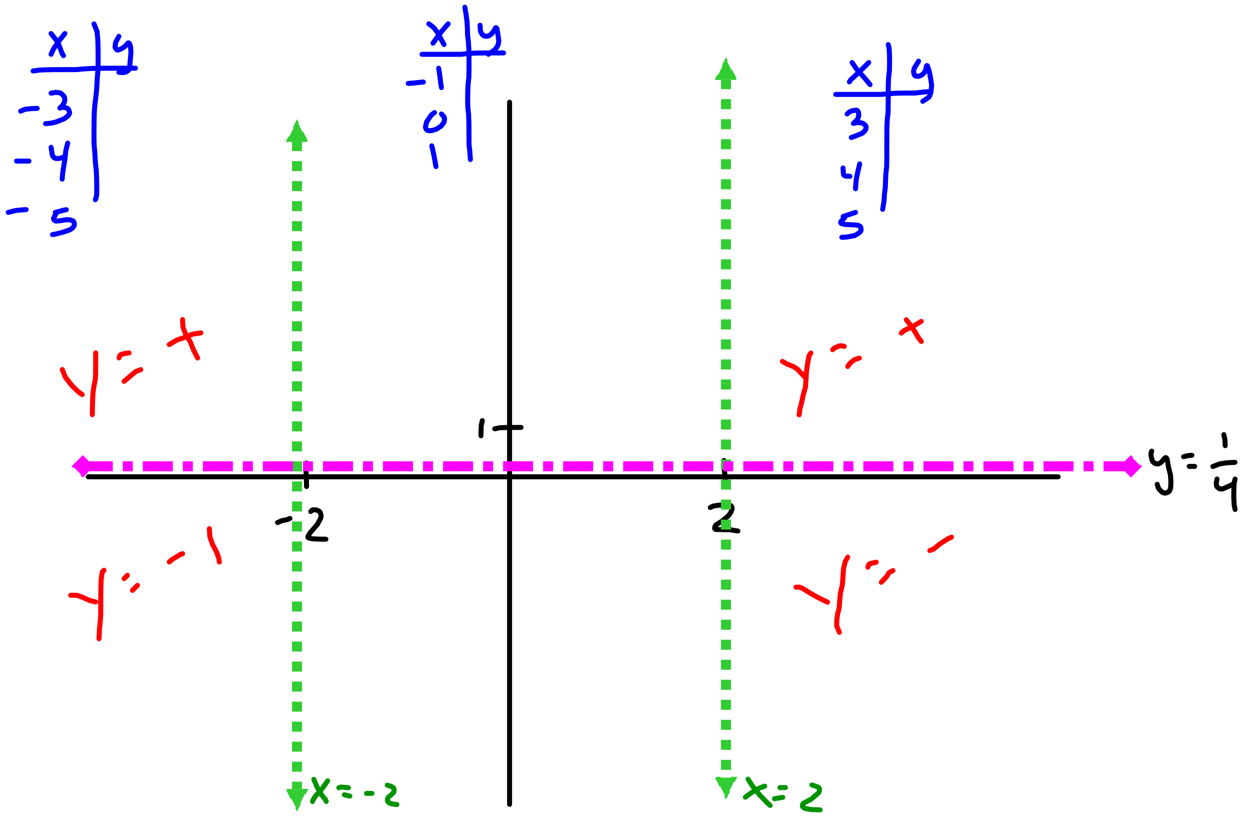
$y=1/4$

| x | y |
|---|---|
| -3 | |
| -4 | |
| -5 | |

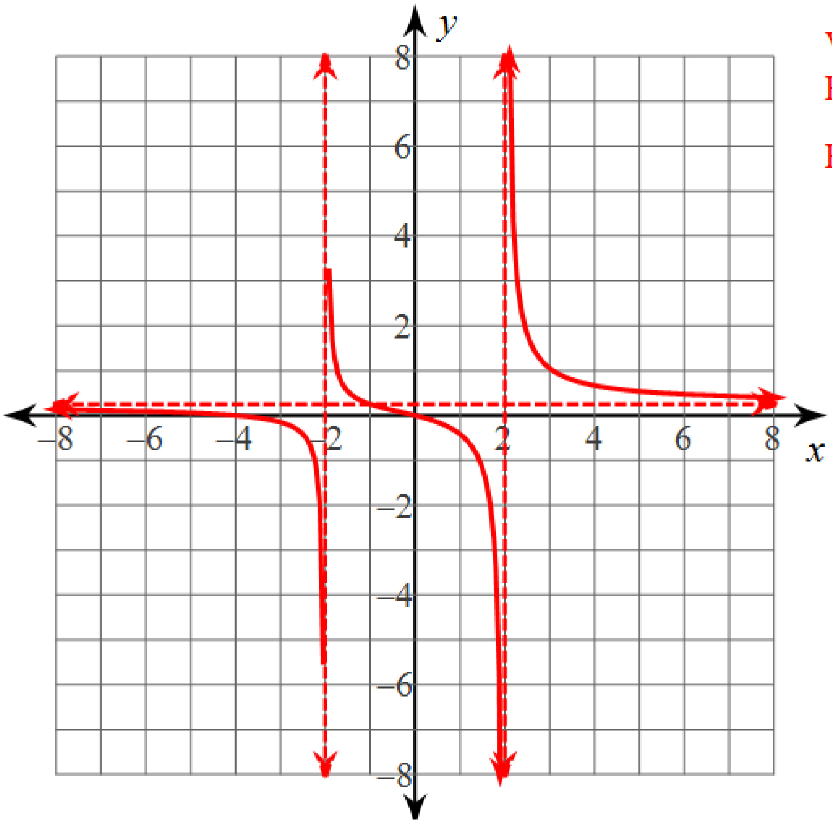
| x | y |
|---|---|
| -1 | |
| 0 | |
| 1 | |

| x | y |
|---|---|
| 3 | |
| 4 | |
| 5 | |



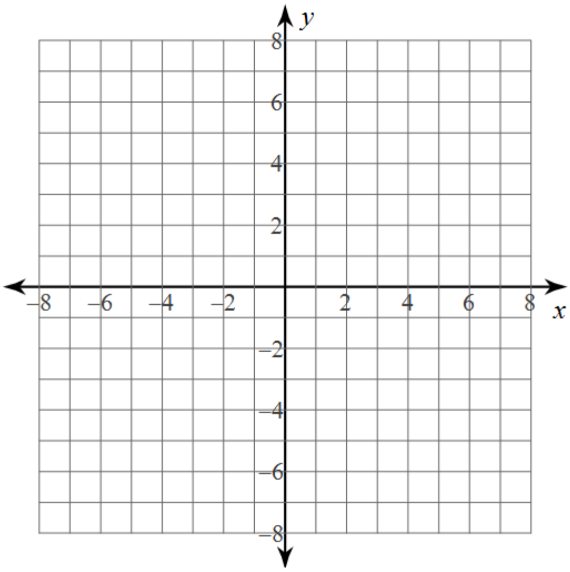

x | y
-3
-4
-5
x | y
-1
0
1
x | y
3
4
5
y = +
y = +
1
-2
2
y = 1/4
y = -1
y = -
x = -2
x = 2

2) $f(x) = \dfrac{x^2 + 4x}{4x^2 - 16}$




Vertical Asym.: $x = 2$, $x = -2$
Holes: None
Horz. Asym.: $y = \dfrac{1}{4}$

3) $f(x) = \dfrac{1}{4x^2 - 36}$



VA denom=0

Holes cancels

HA Rules

3) $f(x) = \dfrac{1}{4x^2 - 36}$

$4(x^2 - 9)$

$4(x-3)(x+3)$

$4(x-3)(x+3) = 0$

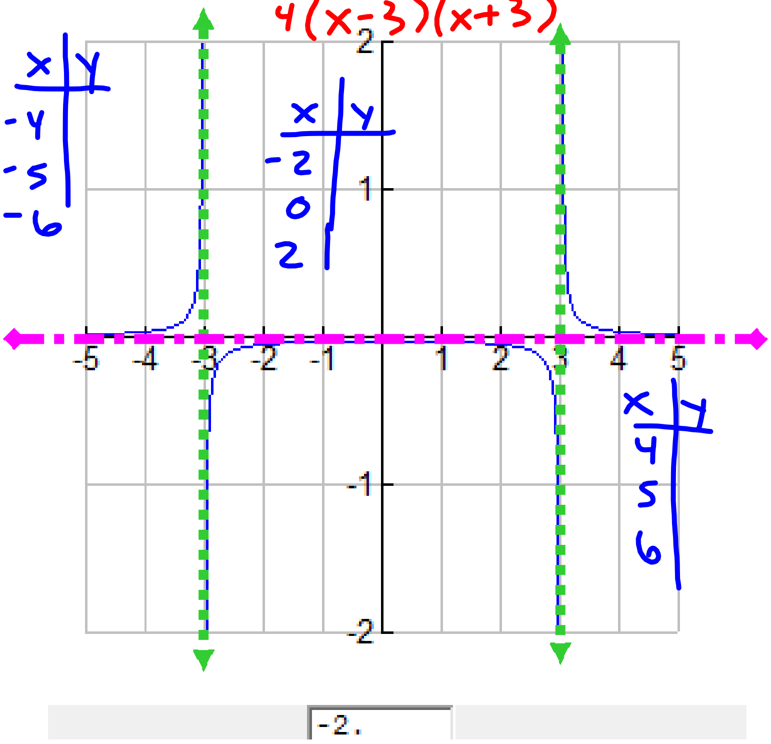
$x-3=0 \qquad x+3=0$

$x=3 \qquad x=-3$

Vertical Asym.: $x = 3$, $x = -3$

Holes: None

Horz. Asym.: $y = 0$



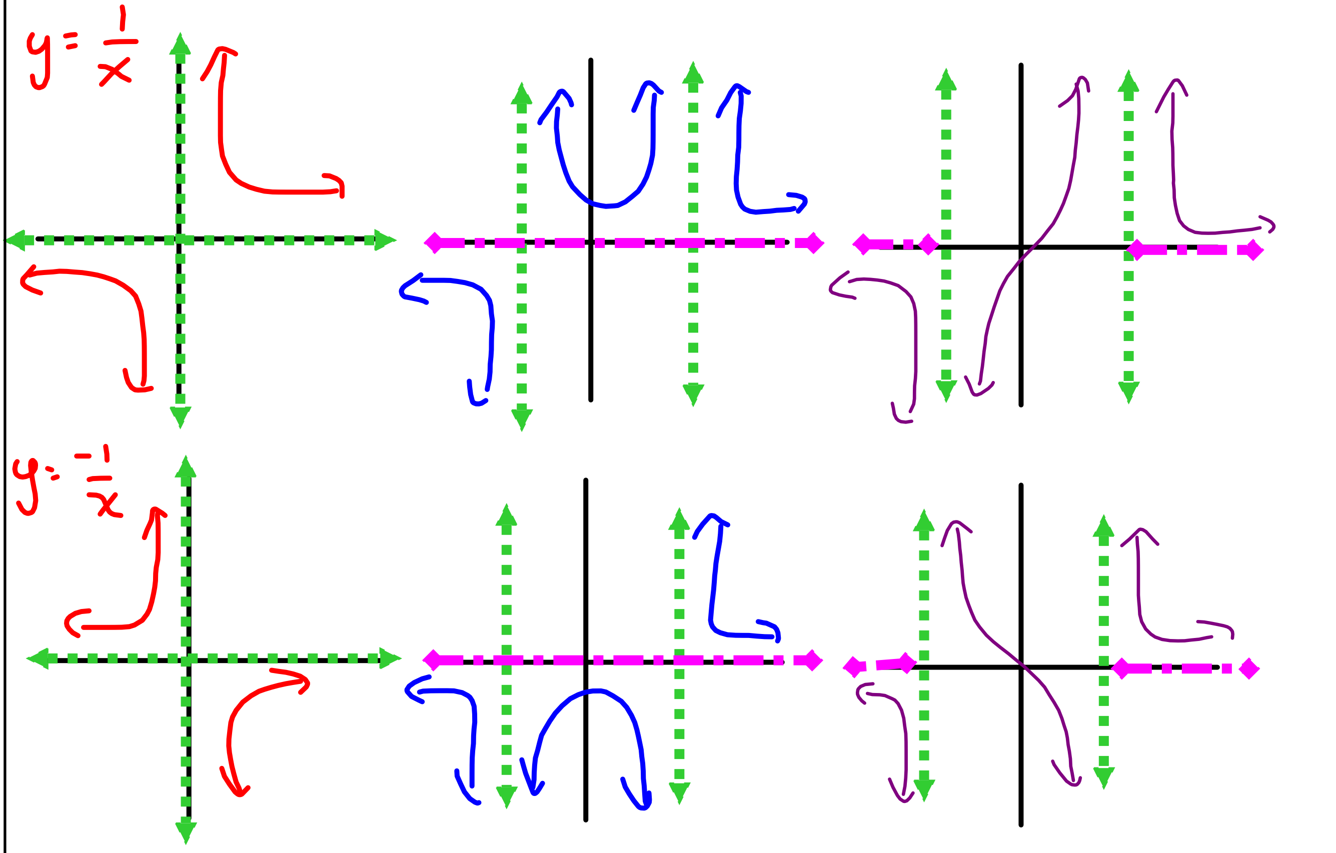

Rules

Highest degree on bottom

$y=0$

$\dfrac{1}{4x^{2}-36}$

What can the graphs look like?



$$f(x) = \frac{x^2 + 4x}{4x^2 - 16}$$

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

$$f(x) = \frac{x^2 + 4x}{4x^2 - 16}$$

1. Simplify $\frac{x(x+4)}{4(x^2-4)}$ $\frac{x(x+4)}{4(x-2)(x+2)}$

2. Cancel out -- find the holes

$\frac{x(x+4)}{4(x-2)(x+2)}$ Nothing cancels out $\boxed{\text{No Holes}}$

3. denominator = 0 -- vertical asymptotes

$4(x-2)(x+2) = 0$

$\frac{\cancel{4}(x-2)(x+2)}{\cancel{4}} = \frac{0}{4}$

$(x-2)(x+2) = 0$

$x-2=0$ $x+2=0$

$x=2$ $x=-2$

$x=-2$ $x=2$

4. highest degree -- horizontal asymptote

highest degree is

Rules : top slant

bottom $y=0$

same coefficients of highest degree

$y = \frac{x(x+4)}{4(x-2)(x+2)} = \frac{\boxed{x^2}+4x}{\boxed{4x^2}-16}$

$\boxed{y = \frac{1}{4}}$

Oct 15-9:37 AM

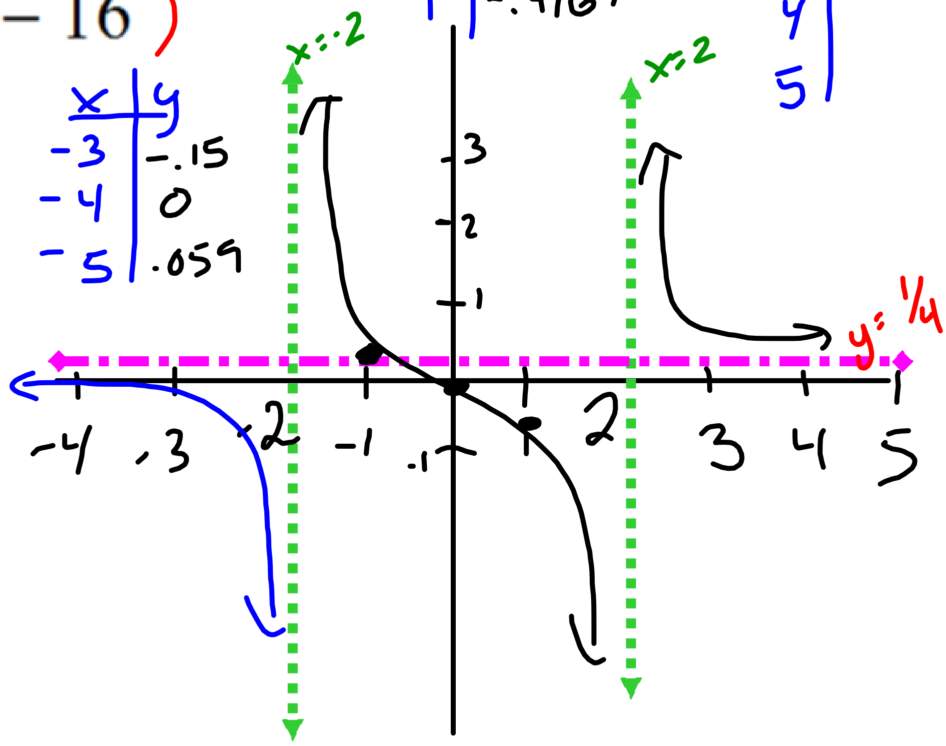
$$f(x) = \frac{(x^2 + 4x)}{(4x^2 - 16)}$$

# Graph

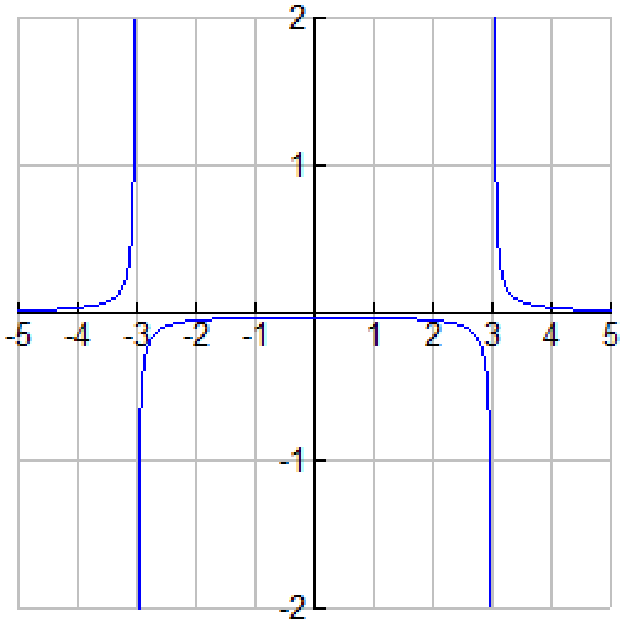
| x | y |
|---|---|
| -1 | .25 |
| 0 | 0 |
| 1 | -.4167 |

| x | y |
|---|---|
| 3 | 1.05 |
| 4 | |
| 5 | |

| x | y |
|---|---|
| -3 | -.15 |
| -4 | 0 |
| -5 | .059 |



3) $f(x) = \dfrac{1}{4x^2 - 36}$




Vertical Asym.: $x = 3$, $x = -3$
Holes: None
Horz. Asym.: $y = 0$

-2.

Feb 11-8:32 PM

$$f(x) = \frac{1}{4x^2 - 36}$$

1. Simplify $\frac{1}{4(x^2-9)} = \frac{1}{4(x-3)(x+3)}$

2. Cancel out -- find the holes

Nothing cancels out

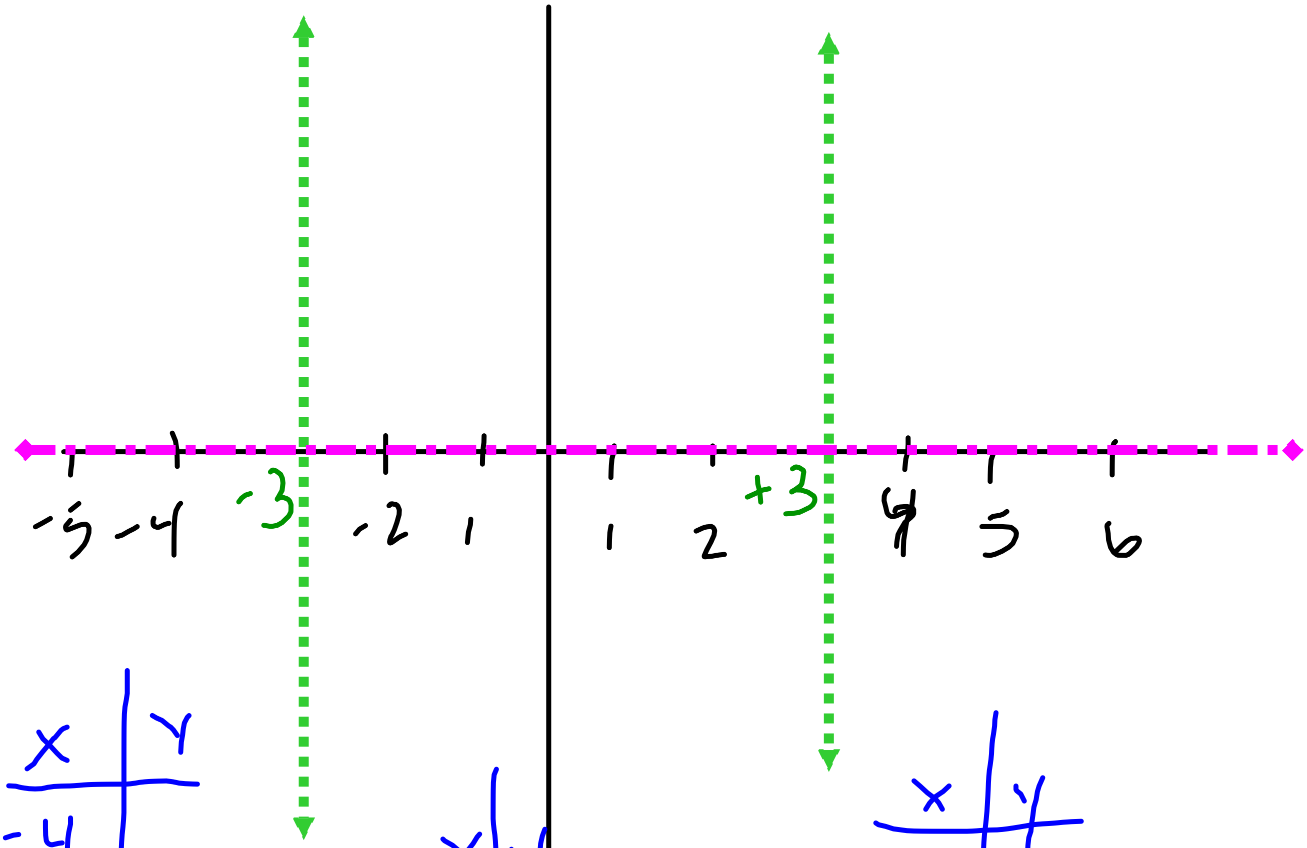
3. denominator = 0 -- vertical asymptotes

$4(x-3)(x+3)=0$
$x=3 \quad x=-3$

4. highest degree -- horizontal asymptote

$\frac{1}{4x^{2}-36}$ bottom $y=0$

$$f(x) = \frac{1}{4x^2 - 36}$$




| x | y |
|---|---|
| -4 | |
| -5 | |
| -6 | |

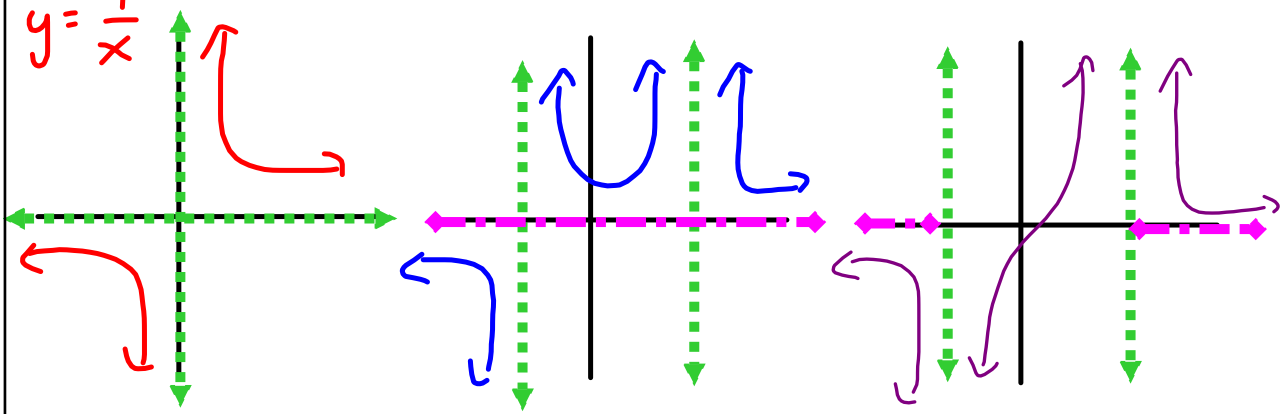
| x | y |
|---|---|
| -1 | |
| 0 | |
| 1 | |

| x | y |
|---|---|
| 4 | |
| 5 | |
| 6 | |

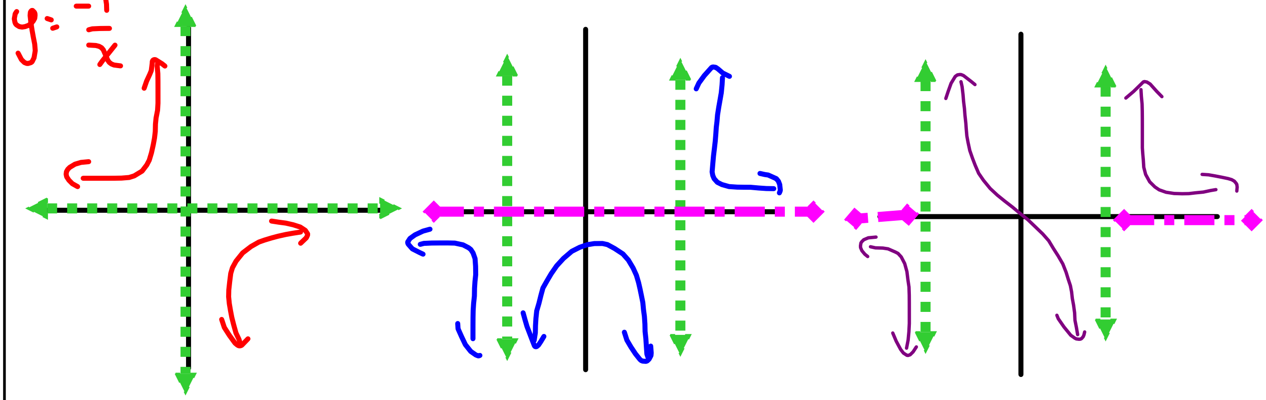
Oct 15-10:21 AM

What can the graphs look like?

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

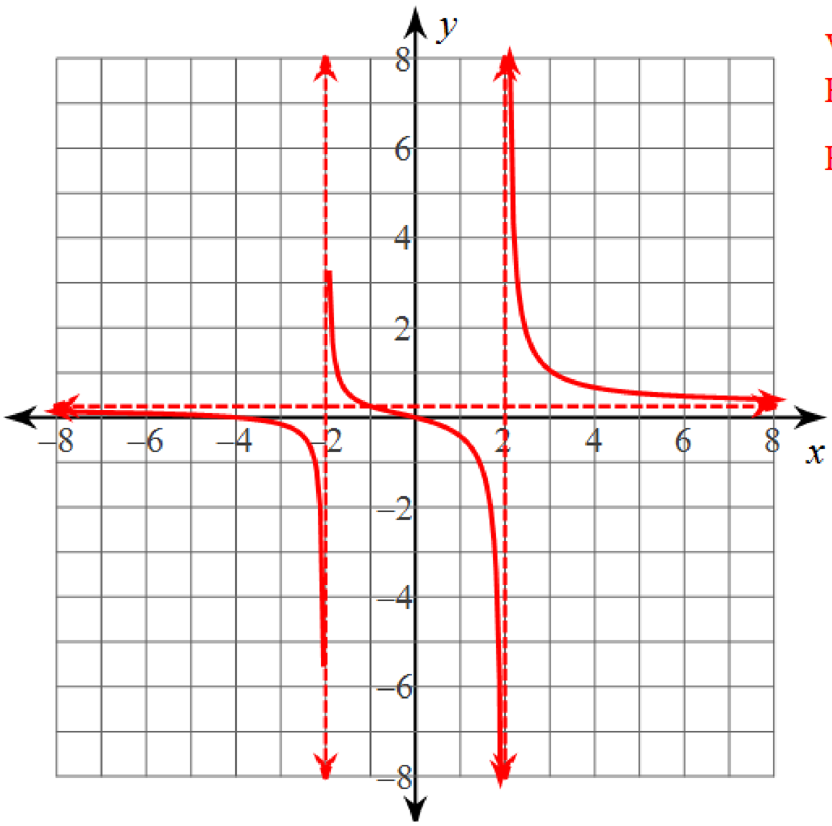


$y = \frac{-1}{x}$



Oct 15-8:36 AM

2) $f(x) = \dfrac{x^2 + 4x}{4x^2 - 16}$



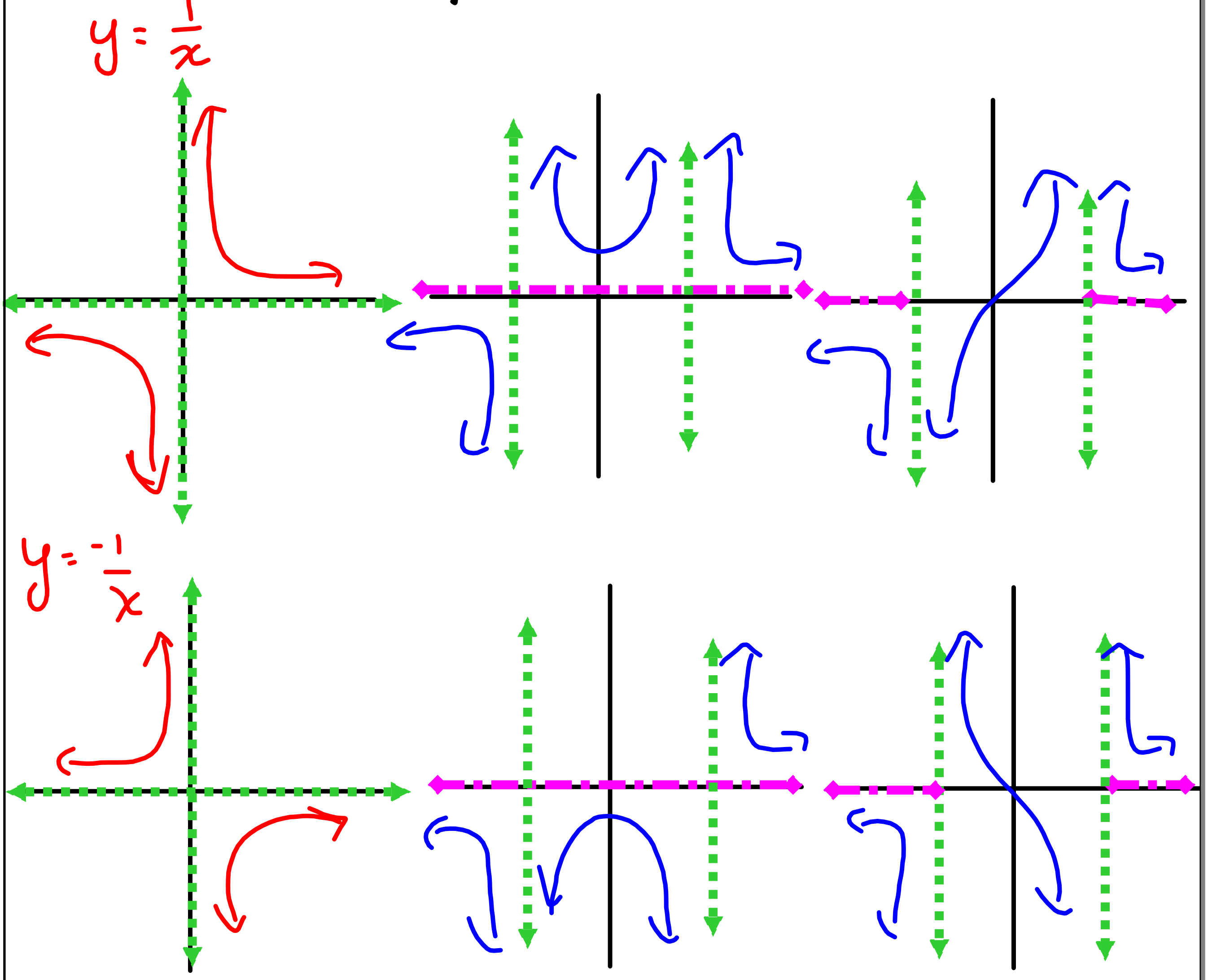
Vertical Asym.: $x = 2,\ x = -2$

Holes: None

Horz. Asym.: $y = \dfrac{1}{4}$

Feb 11-8:32 PM

What will the graphs look like?




Oct 15-12:29 PM

$$f(x) = \frac{x^2 + 4x}{4x^2 - 16}$$

1. Simplify
2. Cancel out -- find the holes
3. denominator = 0 -- vertical asymptotes
4. highest degree -- horizontal asymptote

Oct 15-9:37 AM

$$f(x) = \frac{x^2 + 4x}{4x^2 - 16}$$

1. Simplify $\frac{x^2+4x}{4x^2-16} = \frac{x(x+4)}{4(x^2-4)} = \frac{x(x+4)}{4(x-2)(x+2)}$

2. Cancel out -- find the holes

$\frac{x(x+4)}{4(x-2)(x+2)}$ Nothing cancels out

No Holes

3. denominator = 0 -- vertical asymptotes

$\frac{\cancel{4}(x-2)(x+2)}{\cancel{4}} = \frac{0}{4}$ $x=-2$ $x=2$

$(x-2)(x+2)=0$

$x-2=0$ $x+2=0$

$x=2$ $x=-2$

4. highest degree -- horizontal asymptote

$$f(x) = \frac{1x^{2} + 4x}{4x^{2} - 16}$$

SAME

coefficients of the highest degrees.

$y = \frac{1}{4}$

highest degree

top slant

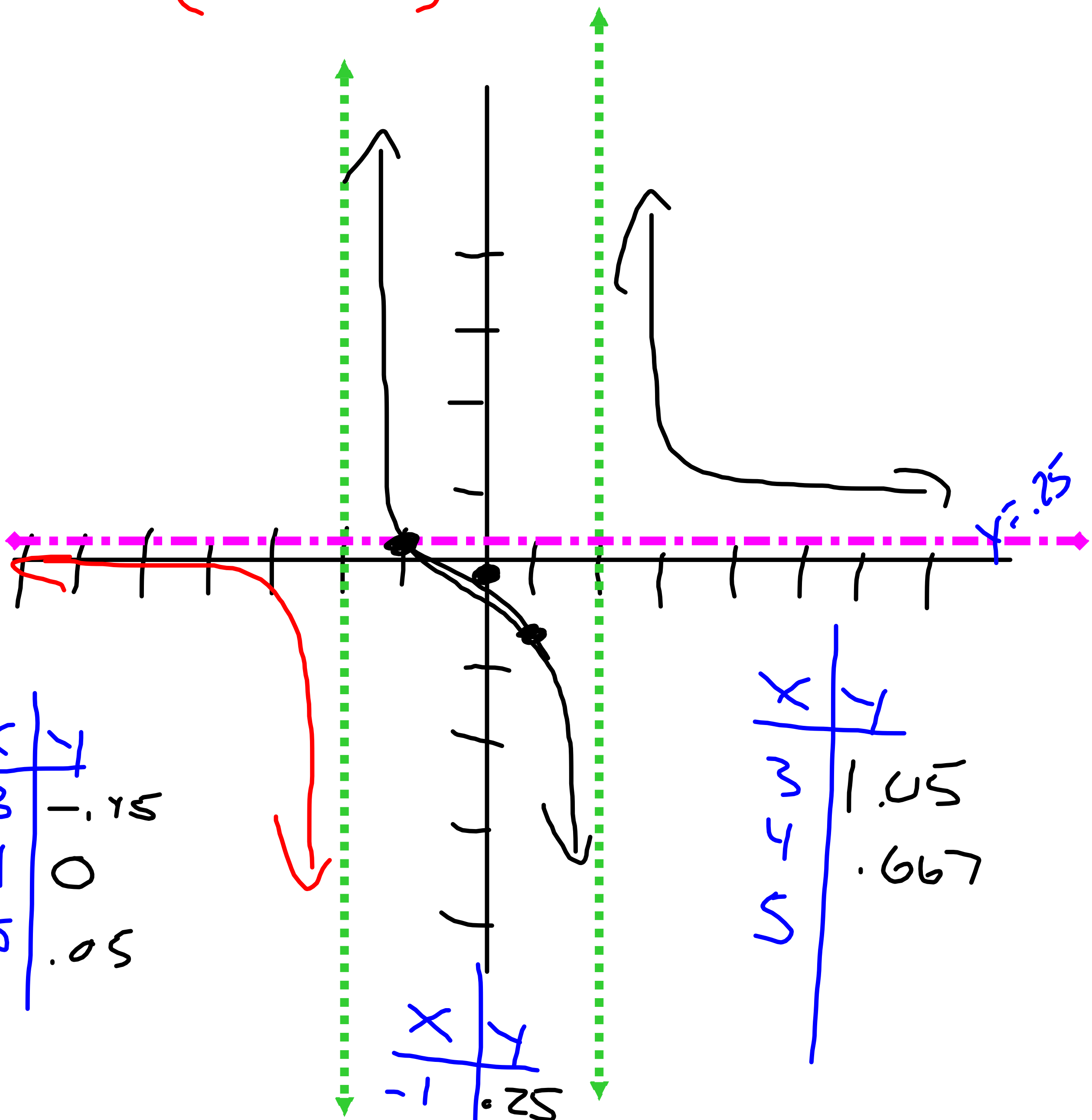
bottom $y=0$

same $y = \boxed{\frac{\ }{\ }}$

coefficients of highest degree

Oct 15-9:37 AM

$$f(x)=\frac{x^2+4x}{4x^2-16}$$



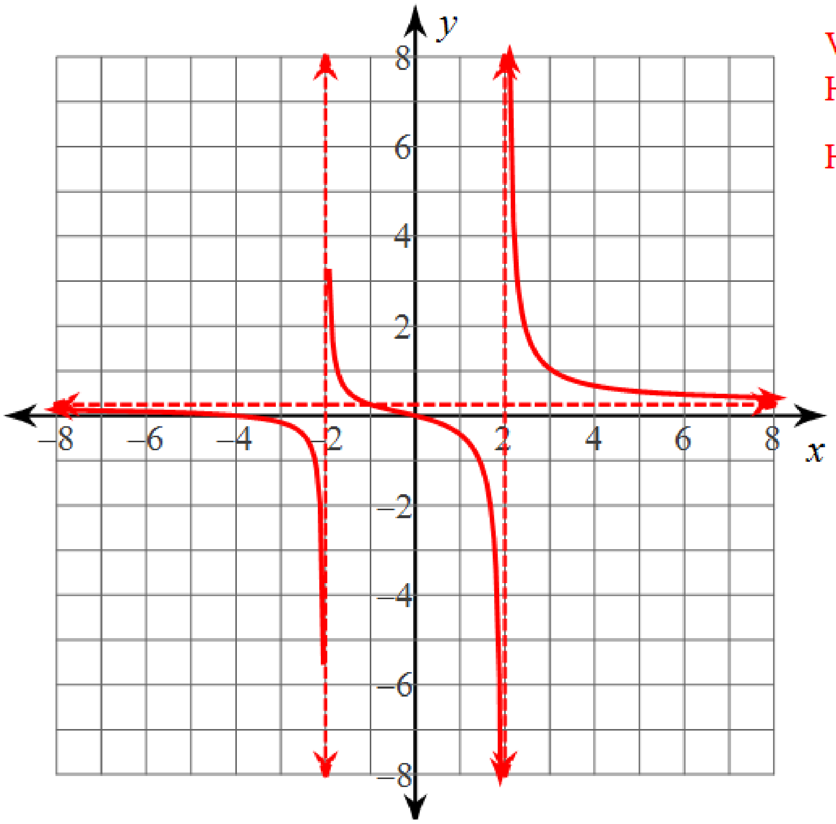

| x | y |
|---|---|
| -3 | -.75 |
| -4 | 0 |
| -5 | .05 |

| x | y |
|---|---|
| -1 | .25 |
| 0 | 0 |
| 1 | -.4167 |

| x | y |
|---|---|
| 3 | 1.05 |
| 4 | .667 |
| 5 | |

Oct 15-12:46 PM

2) $f(x) = \dfrac{x^2 + 4x}{4x^2 - 16}$




Vertical Asym.: $x = 2$, $x = -2$
Holes: None

Horz. Asym.: $y = \dfrac{1}{4}$

$$f(x) = \frac{1}{4x^2 - 36}$$

1. Simplify $\frac{1}{4(x^2-9)} = \frac{1}{4(x-3)(x+3)}$

2. Cancel out -- find the holes

$\frac{1}{4(x-3)(x+3)}$ No holes

3. denominator = 0 -- vertical asymptotes

$4(x-3)(x+3)$

$\frac{\cancel{4}(x-3)(x+3)}{\cancel{4}} = \frac{0}{4}$

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

$\boxed{x = 3 \quad x = -3}$

4. highest degree -- horizontal asymptote

$$f(x) = \frac{1}{4x^2 - 36}$$

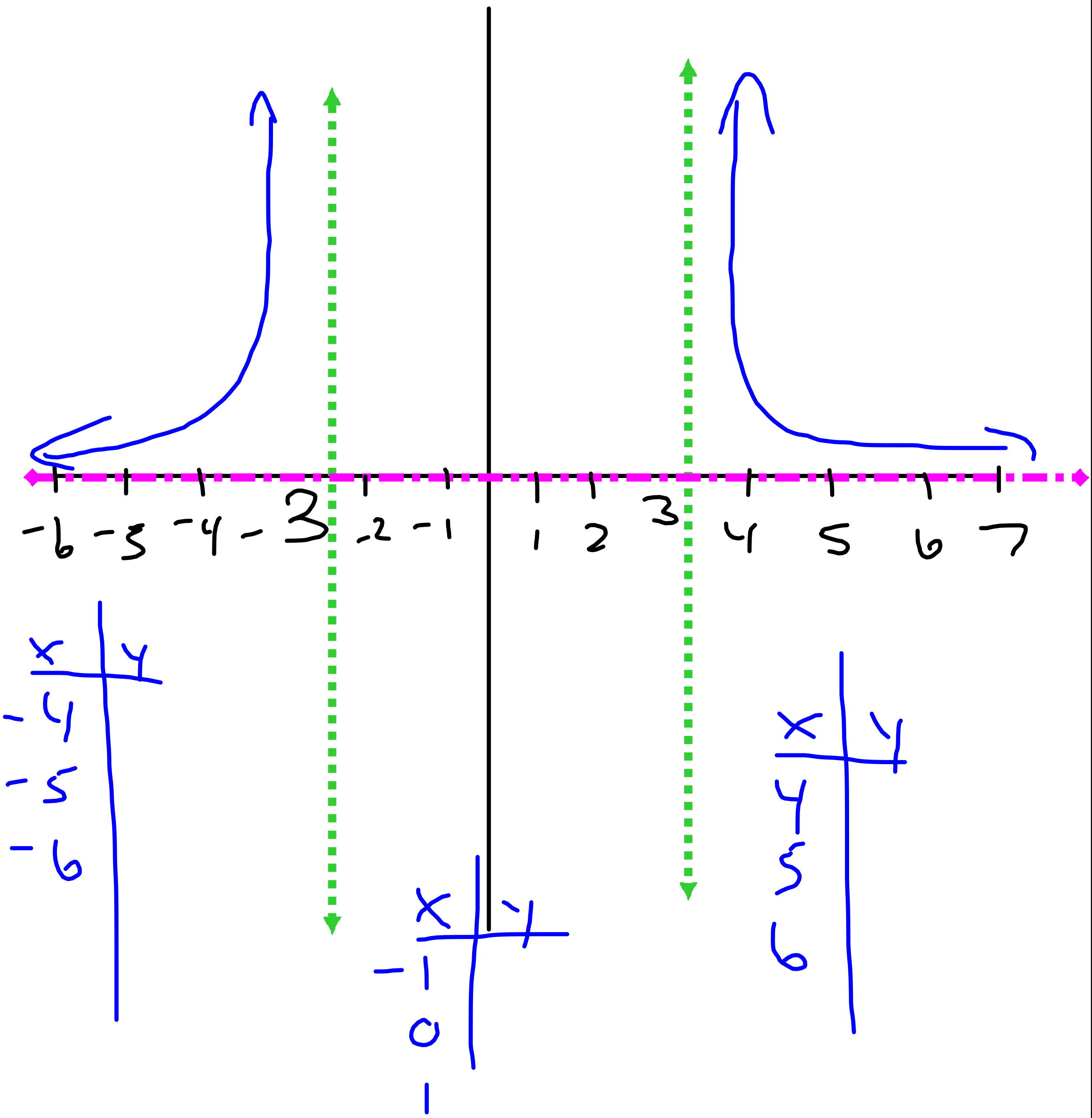
bottom

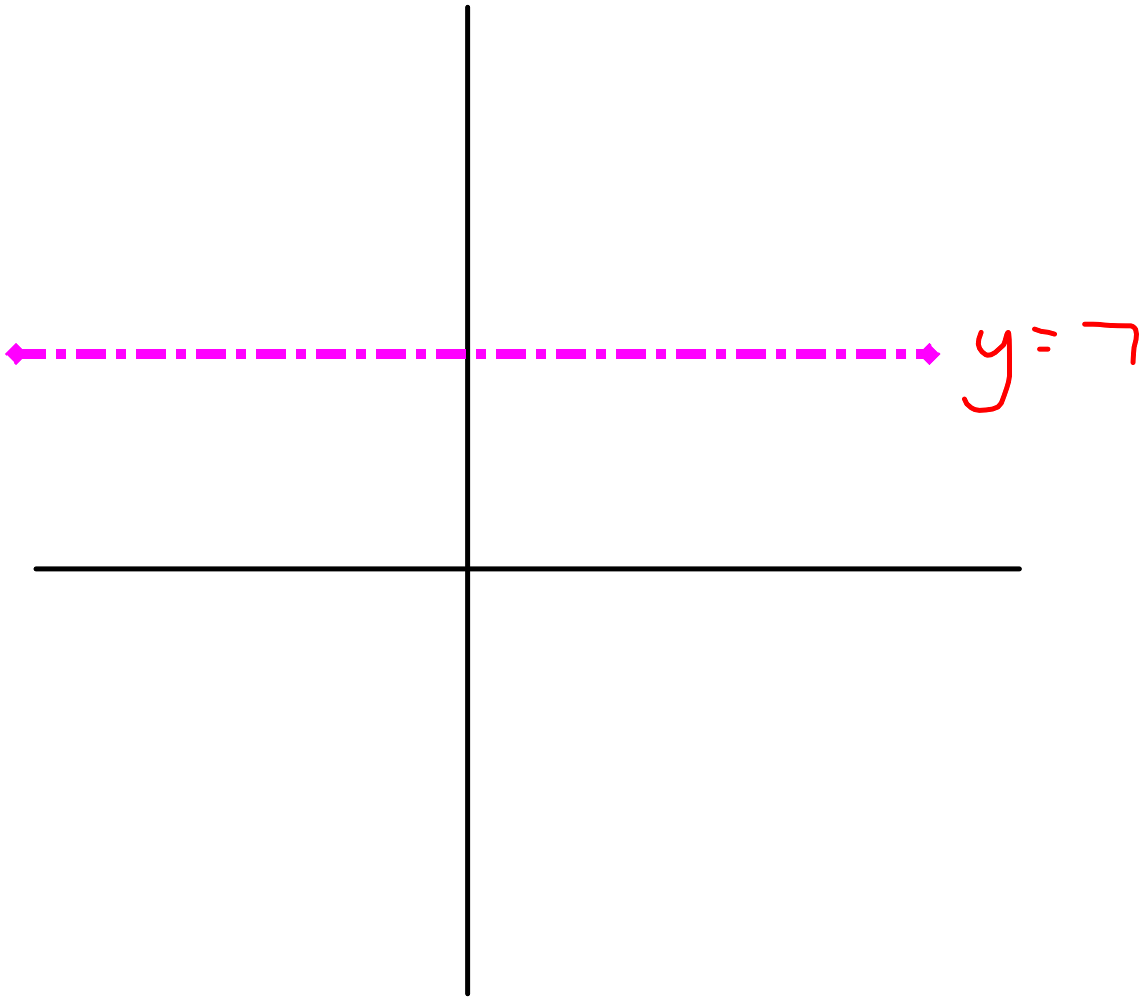
highest degree

$\Rightarrow$ Rules $y = 0$

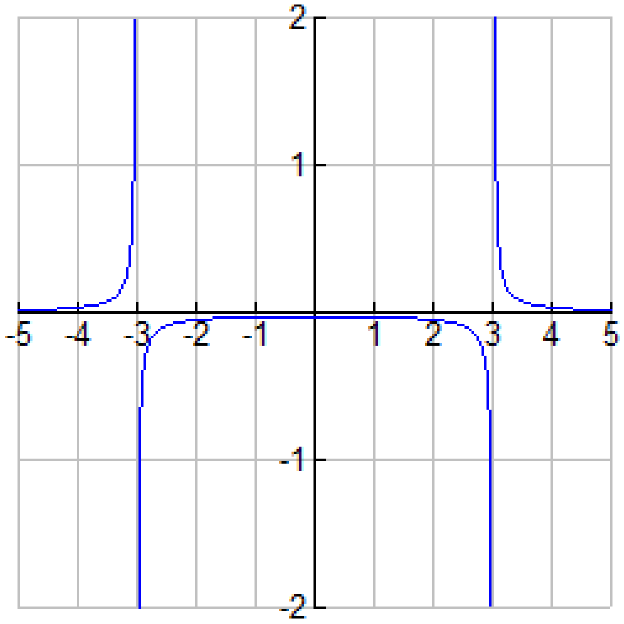
Oct 15-10:19 AM

$$f(x) = \frac{1}{4x^2 - 36}$$




y = 7

3) $f(x) = \dfrac{1}{4x^2 - 36}$




-2.

Vertical Asym.: $x = 3$, $x = -3$
Holes: None
Horz. Asym.: $y = 0$