480/81
Day 2
Notes

7.9 NOTES – GRAPHING RATIONAL FUNCTIONS

Graph each of the following rational functions.

1. $f(x) = \dfrac{5}{(x-1)^2(x+3)}$

hole(s): DNE

x – int: DNE

y – int: $(0, 5/3)$

VA: $x = 1$ $x = -3$

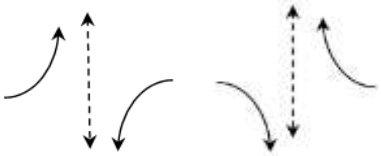
HA: $y = 0$

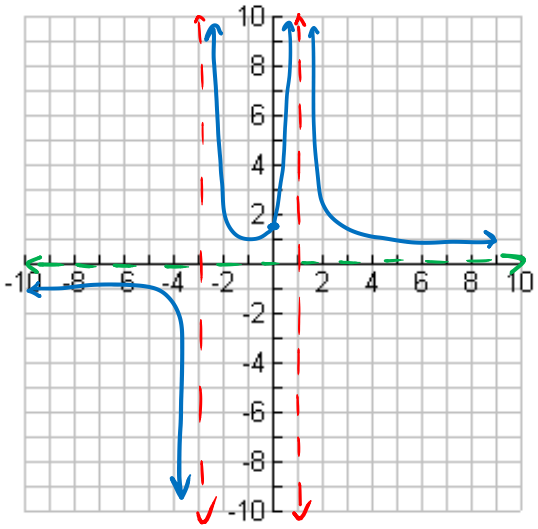
EVEN MULTIPLICITIES

$$\frac{1}{(x-1)^{even}}$$

ODD MULTIPLICITIES

$$\frac{1}{(x-1)^{odd}}$$





2. $f(x) = \dfrac{(x+4)(x-1)}{(x-1)^2(x+4)} = \dfrac{1}{x-1}$

Hole $x = -4$

$f(-4) = \dfrac{1}{5}$

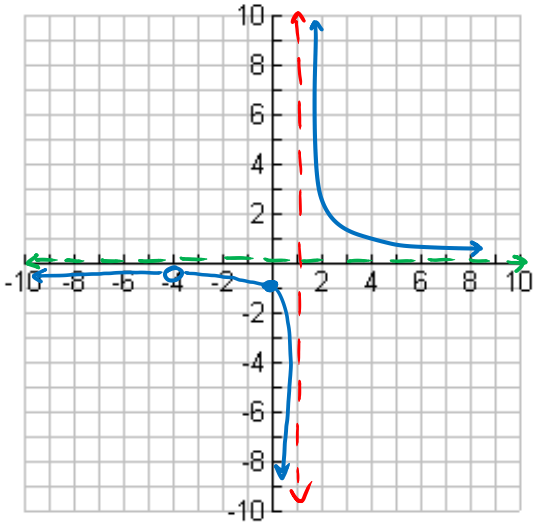
hole(s): $\left(-4, \frac{-1}{5}\right)$

x – int: DNE

y – int: $(0, -1)$

VA: $x = 1$

HA: $y = 0$



3. $f(x)=\dfrac{x^3+8x^2+9x-18}{x+6}$

$-6 \mid 1 \quad 8 \quad 9 \quad -18$
$\quad\quad -6 \quad -12 \quad 18$
$\quad 1 \quad 2 \quad -3 \quad 0$

$f(x) \quad \dfrac{(x-1)(x+3)(x+6)}{(x+6)}$

x^2+2x-3

$(x-1)(x+3)$

$f(-6)=(-7)(-3)=21$

Quadratic!

Find vertex

$\frac{-2}{2(1)}=-1$

$V:(-1,-4)$

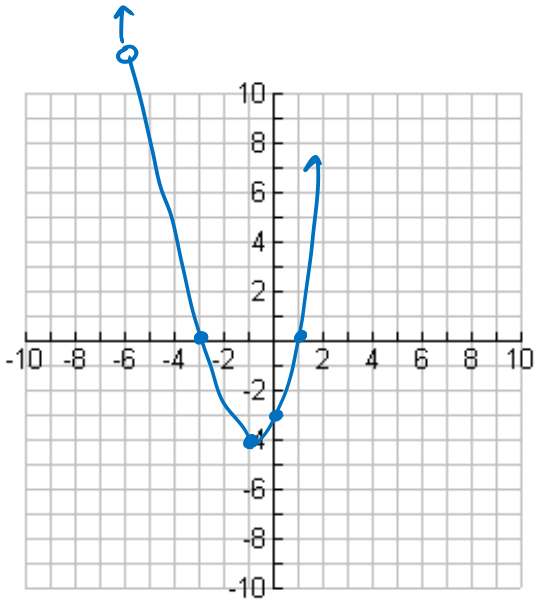
hole(s): $(-6,21)$

x – int: $(1,0)\ (-3,0)$

y – int: $(0,-1)$

VA: NONE

HA: NONE



4. $f(x)=\dfrac{(x-2)}{x^3+5x^2-8x-12}$

$2 \mid 1 \quad 5 \quad -8 \quad -12$
$\quad\quad 2 \quad 14 \quad 12$
$\quad 1 \quad 7 \quad 6 \quad \boxed{0}$

$f(x)=\dfrac{(x-2)}{(x-2)(x+6)(x+1)}$

x^2+7x+6

$(x+6)(x+1)$

Hole: $x=2$

$\frac{1}{8(3)}=\frac{1}{24}$

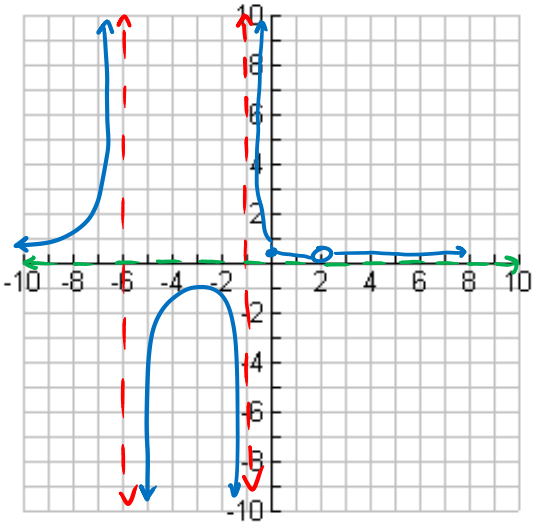
hole(s): $(2,\frac{1}{24})$

x – int: DNE

y – int: $(0,\frac{1}{6})$

VA: $x=-1 \quad x=-6$

HA: $y=0$



GOING THROUGH THE HORIZONTAL ASYMPTOTE

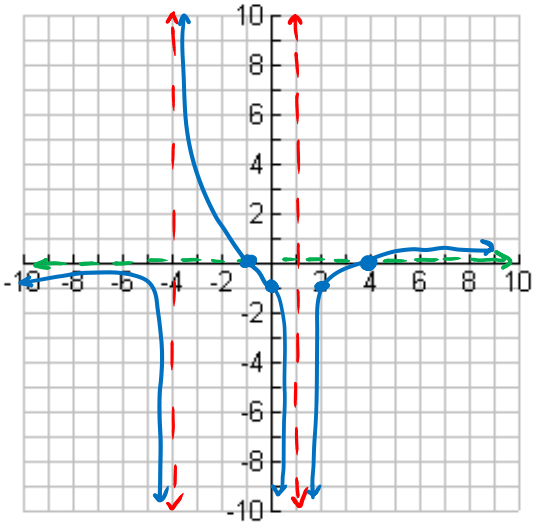
Functions can **never cross a vertical asymptote**, but sometimes, they can cross the horizontal asymptote.

HORIZONTAL ASYMPTOTE:

- Tells the "long run" behavior of the function past the vertical asymptotes or x-intercepts.
- Horizontal asymptotes are not asymptotic in the middle. It is okay to cross a horizontal asymptote in the middle.

5. $f(x)=\dfrac{(x-4)(x+1)}{(x+4)(x-1)^2}$

$f(2)=\dfrac{(-2)(3)}{(6)(1)}=-1$



hole(s): None

x – int: (4,0)(-1,0)

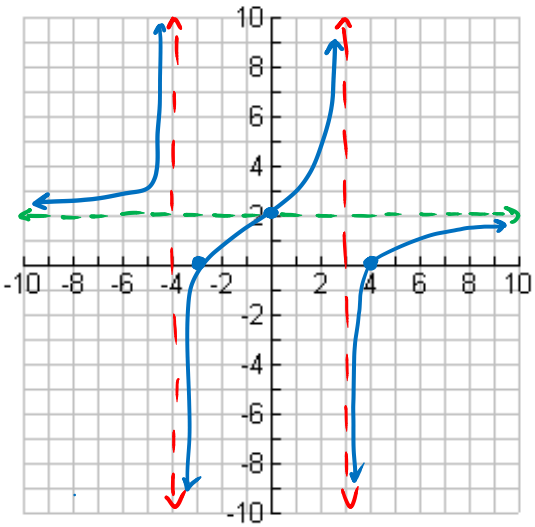
y – int: (0,-1)

VA: x = 1 x = -4

HA: y = 0

6. $f(x)=\dfrac{2x^2-2x-24}{x^2+x-12}$ $\dfrac{2(x^2-x-12)}{x^2+x-12}=\dfrac{2(x+3)(x-4)}{(x+4)(x-3)}$

$f(0)=\dfrac{2(3)(-4)}{(4)(-3)}=2$



hole(s): NONE

x – int: (-3,0)(4,0)

y – int: (0,2)

VA: x = 3 x = -4

HA: y = 2

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

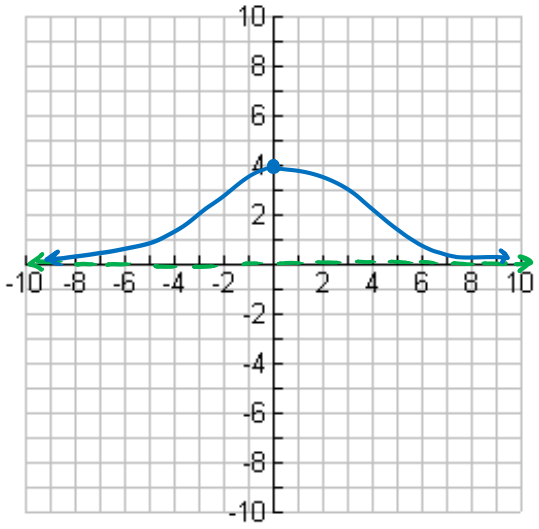
hole(s): NONE

x – int: DNE

y – int: (0, 4)

VA: DNE

HA: $y = 0$



8. $f(x) = \dfrac{5x^2}{x^2 + 2}$

hole(s): NONE

x – int: (0,0)

y – int: (0,0)

VA: DNE

HA: $y = 5$