Name *Answer Key*

PreCalculus; Sec 2.6/2.7c – Rational Functions

Graph the rational function by (a) finding the intercepts, (b) finding the asymptotes, and (c) using your brain (or an xy-chart) to fill in the rest!

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

Hole at $x=2$

a) x-intercept $(y=0)$

$0 \neq 1$

$\boxed{\text{NONE}}$

y-intercept $(x=0)$

$(0, \frac{1}{2})$

B) Vertical Asym.

$x+2=0$

$\boxed{x=-2}$

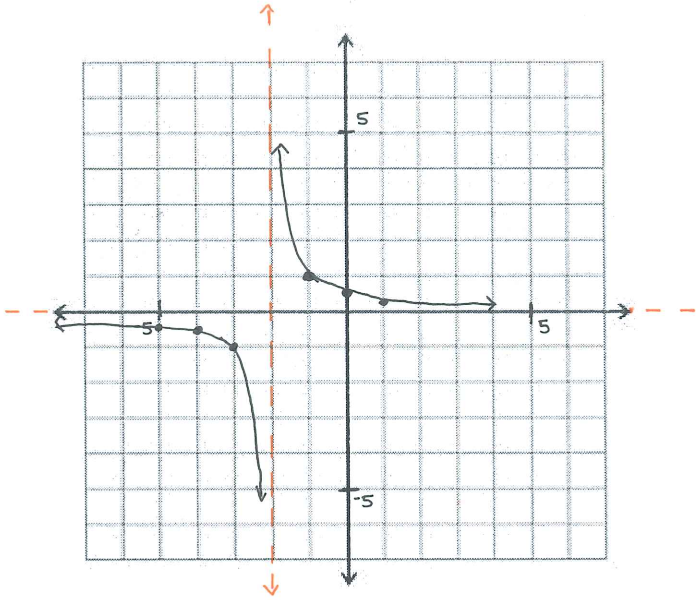
Horizontal Asym.

$n=0 \quad m=1$

$n<m \rightarrow \boxed{y=0}$

c)

x	y
-5	$-\frac{1}{3}$
-4	$-\frac{1}{2}$
-3	-1
-1	1
0	$\frac{1}{2}$
1	$\frac{1}{3}$



2. $g(x) = \frac{x^2-5x+4}{x^2+3x-4} = \frac{(x-4)(\cancel{x-1})}{(x+4)(\cancel{x-1})} = \frac{x-4}{x+4}$

Hole at $x=1$

a) x-intercept $(y=0)$

$(4,0)$

y-intercept $(x=0)$

$(0,-1)$

B) Vertical Asym.

$x+4=0$

$\boxed{x=-4}$

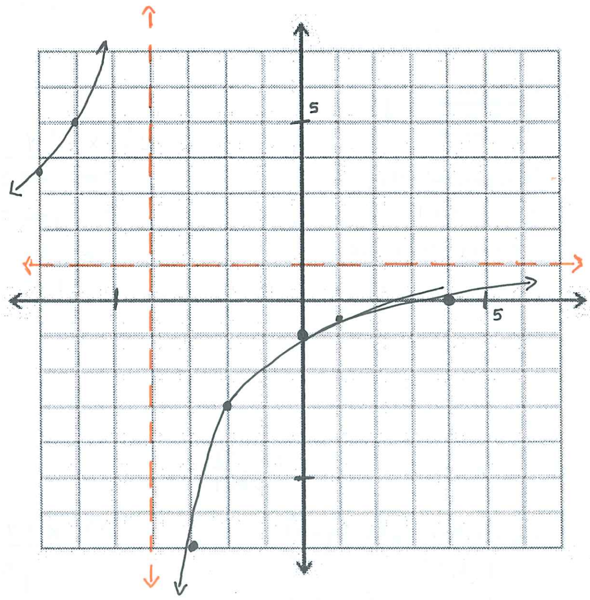
Horizontal Asym.

$n=1 \quad m=1$

$n=m \rightarrow \boxed{y=\frac{x}{x}=1}$

c)

x	y
-7	3.7
-6	5
-5	9
-3	-7
-2	-3
1	-0.6



3. $h(x) = \frac{x^3-8}{x^2} = \frac{(x-2)(x^2+2x+4)}{x^2}$

a) x-intercept $(y=0)$

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

$\boxed{(2,0)}$

y-intercept $(x=0)$

$\boxed{\text{NONE}}$

B) Vertical Asym.

$x^2=0$

$\boxed{x=0}$

Horizontal Asym.

$n=3 \quad m=2$

$n>m \rightarrow$ NONE

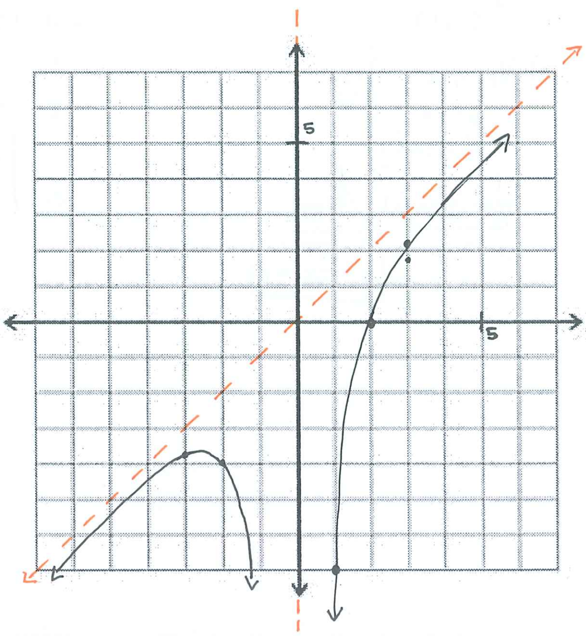
Slant Asym.

$$\begin{array}{r} \boxed{x} \\ x^2 \overline{)\, x^3+0x^2+0x-8} \\ -(x^3) \\ \hline 0x^2+0x-8 \end{array}$$

c)

x	y
-3	-3.9
-2	-4
-1	-9

x	y
1	-7
2	0
3	2.1



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

a) x-intercepts $(y=0)$

$(1,0)$ $(-1,0)$

y-intercept $(x=0)$

NONE

B) Vertical Asym.

$x^3=0$

$\boxed{x=0}$

Horizontal Asym.

$n=4$ $m=3$

$n>m \to$ none

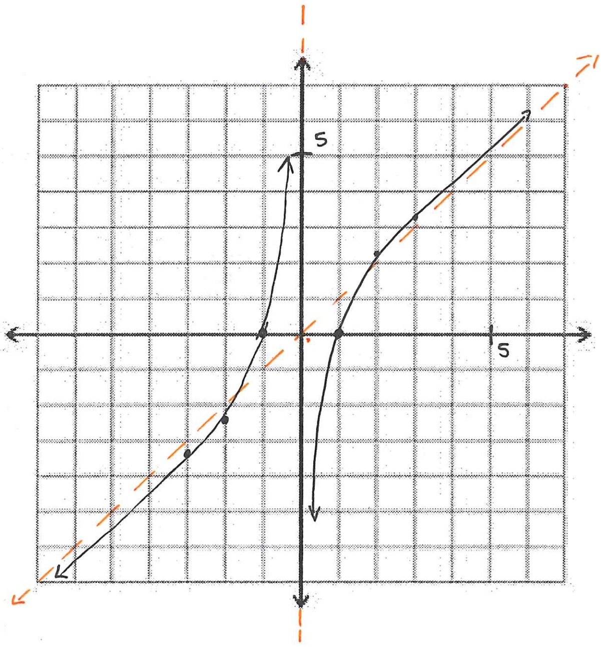
Slant Asym.

$$\begin{array}{r|l} & \boxed{x} \\ x^3 & x^4+0x^3+x^2+0x-2 \\ & -\ x^4 \\ \hline & 0x^3+x^2+0x-2 \end{array}$$

c)

x	y
-3	-3.3
-2	-2.3
-1	0

x	y
1	0
2	2.3
3	3.3



5. $g(x) = \frac{(x+4)(x-2)}{x+3}$

a) x-intercepts $(y=0)$

$(-4,0)$ $(2,0)$

y-intercept $(x=0)$

$(0, -8/3)$

b) Vertical Asym.

$\boxed{x=-3}$

Horizontal Asym.

$n=2$ $m=1$

$n>m \to$ NONE

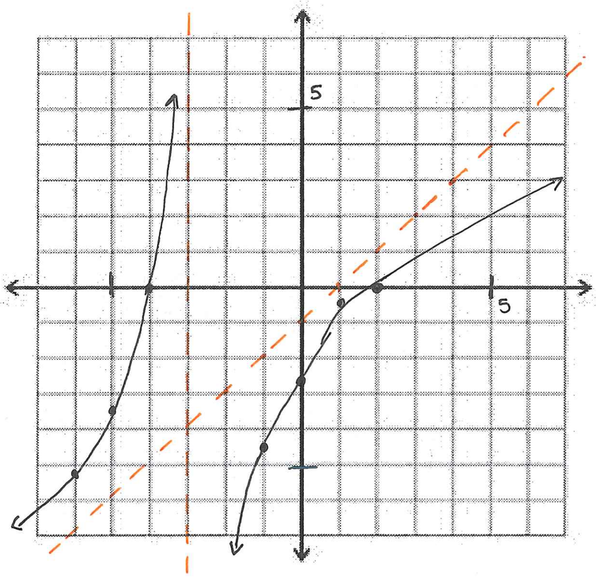
Slant Asym.

$$\begin{array}{r|l} & \boxed{x-1} \\ x+3 & x^2+2x-8 \\ & -(x^2+3x) \\ \hline & -x-8 \\ & -(-x-3) \\ \hline & -5 \end{array}$$

c)

x	y
-6	-5.3
-5	-3.5
-4	0

x	y
-2	-8
-1	-4.5
0	-2.7



6. $h(x) = \frac{x^2+6x+9}{x^2+9} = \frac{(x+3)^2}{x^2+9}$

a) x-intercepts $(y=0)$

$(-3,0)$

y-intercept $(x=0)$

$(0,1)$

b) Vertical Asym.

$x^2+9=0$

$\boxed{\text{NONE}}$

Horizontal Asym.

$n=2$ $m=2$

$n=m \to \boxed{y = \frac{x^2}{x^2} = 1}$

c)

x	y
-6	0.2
-5	0.1
-4	0.04
-3	0
-2	0.07
-1	0.4
0	1