H. Algebra 2

Module 8 Review– No Graphing Calculator

Name: Key **Date:** **Hour:**

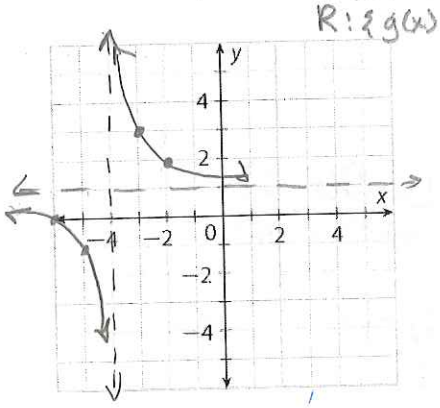
1. Tell the transformations that have been applied to the graph of $f(x) = \frac{1}{x}$ to produce the graph of $g(x)$, then find the asymptotes and domain and range and sketch the graph of $g(x)$.

$\frac{1}{b}(x-h)$ $\quad \frac{1}{2x-4} = \frac{1}{2(x-2)}$

A) $g(x) = 2\left(\frac{1}{x+4}\right) + 1$

V.S factor of 2
Horz shift left 4
Vert shift up 1

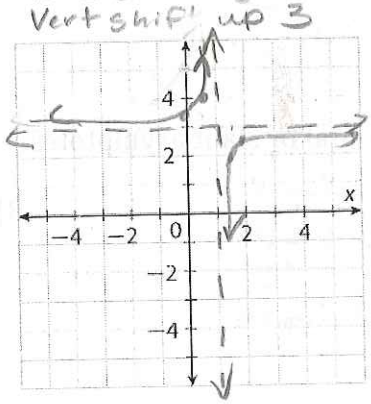
V.A. $x = -4$
H.A $y = 1$
D: $\{x \mid x \neq -4\}$
R: $\{g(x) \mid g(x) \neq 1\}$



B) $g(x) = \frac{1}{-2(x-1)} + 3$

Reflect over y-axis
Horz comp factor 1/2
Horz shift right 1
Vert shift up 3

V.A. $x = 1$
H.A. $y = 3$
D: $\{x \mid x \neq 1\}$
R: $\{g(x) \mid g(x) \neq 3\}$



For 2-3, rewrite the function in $g(x) = a\left(\frac{1}{(x-h)}\right) + k$ or $g(x) = \left(\frac{1}{\frac{1}{b}(x-h)}\right) + k$ form, then find the asymptotes and domain and range and sketch the graph of $g(x)$.

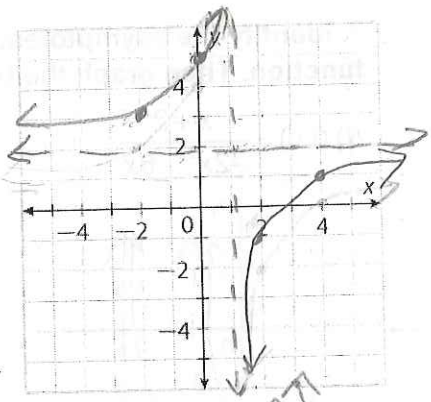
2. $g(x) = \frac{2x-5}{x-1}$

$x-1 \overline{)2x-5}$ → 2; $-(2x-2)$; -3

$g(x) = \frac{-3}{x-1} + 2$

$g(x) = -3\left(\frac{1}{x-1}\right) + 2$

VA $x = 1$ $\quad$ D: $\{x \mid x \neq 1\}$
HA $y = 2$ $\quad$ R: $\{g(x) \mid g(x) \neq 2\}$



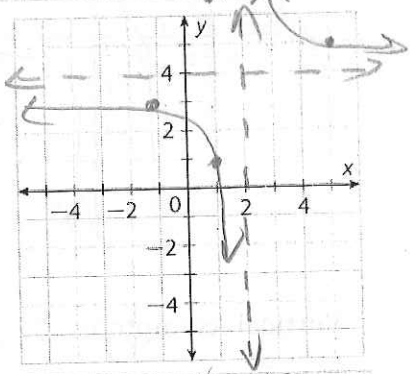
3. $g(x) = \frac{4x-5}{x-2}$

$x-2 \overline{)4x-5}$ → 4; $-(4x-8)$; 3

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

$g(x) = 3\left(\frac{1}{x-2}\right) + 4$

VA $x = 2$ $\quad$ D: $\{x \mid x \neq 2\}$
HA $y = 4$ $\quad$ R: $\{g(x) \mid g(x) \neq 4\}$



$\frac{1}{3x+9} + 5$

$3(x+3)$

4. Write a function for the graph in the form $g(x) = a\left(\frac{1}{(x-h)}\right) + k$.

$g(x) = -4\left(\frac{1}{x+2}\right) + 1$

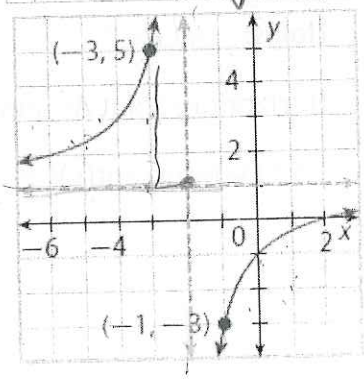
$h = -2$
$h = 1$
$a = -4$

Reflection!

$5 = a\left(\frac{1}{-3+2}\right) + 1$

$4 = a\left(\frac{1}{-1}\right)$

$-4 = a$



5. Identify all vertical asymptotes and holes of each rational function. Then state its domain.

A) $f(x)=\dfrac{x-1}{-3x^2+27}=\dfrac{x-1}{-3(x^2-9)}=\dfrac{x-1}{-3(x-3)(x+3)}$

Vertical Asymptotes: $x=3$ $x=-3$

Holes: None

Domain: $\{x \mid x \neq -3, 3\}$

B) $f(x)=\dfrac{-x^2-3x+4}{x^2+2x-8}=\dfrac{-(x+4)(x-1)}{(x+4)(x-2)}$

Vertical Asymptotes: $x=2$

Holes: $x=-4$ $(-4, 5/6)$

Domain: $\{x \mid x \neq -4, 2\}$

$\dfrac{-(-4-1)}{(-4-2)}+\dfrac{5}{6}$

6. Determine the horizontal or slant asymptotes.

A) $f(x)=\dfrac{x^2-4}{-3x}$ HA: None

$P(x)$ > $q(x)$ degree degree

$-3x \overline{)\, x^2-4}$

$-x^2$

-4

Slant Asymptote $y=-\frac{1}{3}x$

VA: $x=0$

B) $f(x)=\dfrac{x^2+5x+6}{x^2+7x+12}=\dfrac{(x+3)(x+2)}{(x+3)(x+4)}$

VA: $x=-4$

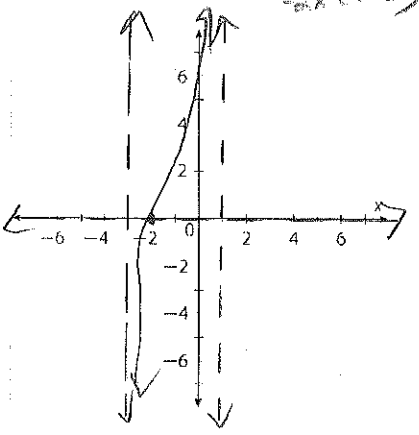
Holes: $x=-3$ $(-3,-1)$

HA: $y=\frac{1}{1}$ $y=1$

$\dfrac{-2+3}{-3+4}=\dfrac{-1}{1}$

7. Identify the asymptotes, holes, y-intercepts and *x*-intercepts of each rational function. Then graph the function.

A) $f(x)=\dfrac{x+2}{-2x^2-6x}=\dfrac{x+2}{-2x(x+3)}$



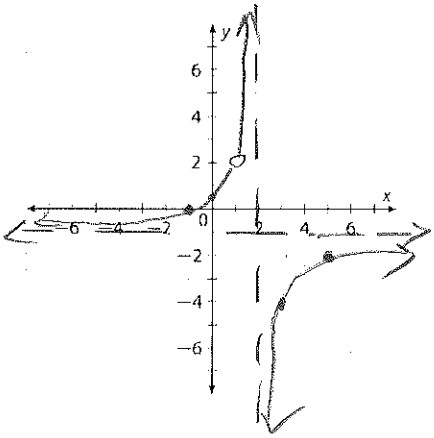
Ver. Asy.: $x=0$ $x=-3$

Holes: None

Horz./Slant Asy: $y=0$

x-and y-int(s): $(-2,0)$ No y-int

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



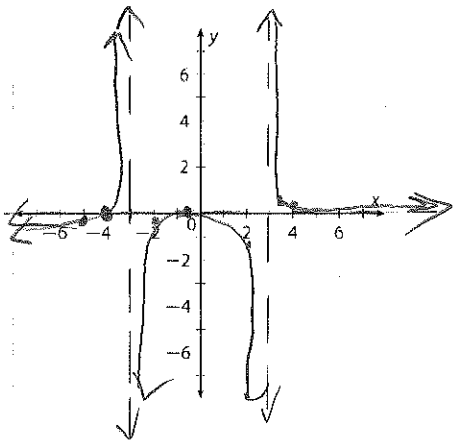
Ver. Asy.: $x=2$

Holes: $(1,2)$

Horiz./Slant Asy.: $y=-1$

x and y-int(s): $(-1,0)$ $(0,1/2)$

C) $f(x)=\dfrac{x+4}{x^2-9}=\dfrac{x+4}{(x+3)(x-3)}$



x	y
-5	$\frac{-5+4}{25-9}=\frac{-1}{16}$
-2	$\frac{2}{4-9}=\frac{2}{-5}$
2	$\frac{6}{-5}$
4	$\frac{8}{64-9}=\frac{8}{55}$
+3½	$\frac{7.5}{12.25}=.6$

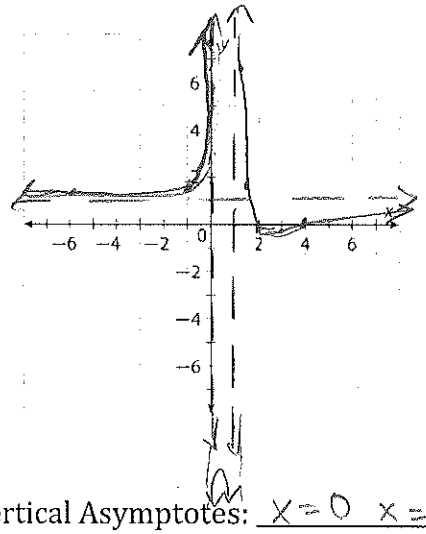
Ver. Asy.: $x=3$ $x=-3$

Holes: None

Horiz./Slant Asy.: $y=0$

x and y-int(s): $(-4,0)(0,-4/9)$

D) $f(x) = \frac{x^2-6x+8}{x^2-x}$ $\frac{(x-4)(x-2)}{x(x-1)}$



x	f(x)
-6	$\frac{36-24+8}{36-6} = \frac{8}{30}$
-1	$\frac{1+6+8}{1+1} = \frac{3}{2}$
1/4	-35
2/4	-21
3/4	-21.67
3/2	1.6
3	-.1667
8	.4441

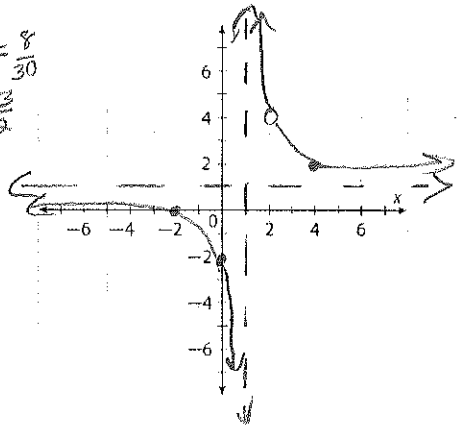
Vertical Asymptotes: $x=0$ $x=1$

Holes: None

Horizontal/Slant Asymptotes: $y=1$

x-and y-intercept(s): (4,0)(2,0) No y int.

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



x	f(x)

Vertical Asymptotes: $x=1$

Holes: (2, 4)

Horizontal/Slant Asymptotes: $y=1$

x and y-intercept(s): (-2, 0)(0, -2)