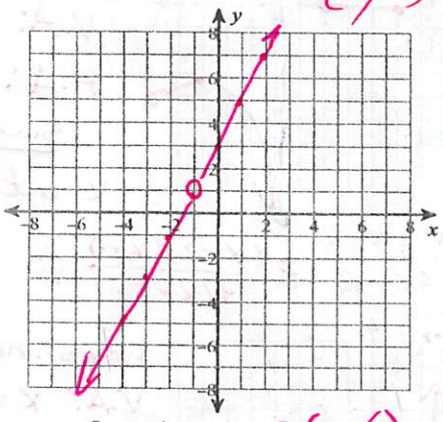
SM3 Name _____

7.4 Homework

Date _____ Period ____

Graph each of the following WITHOUT desmos and state the domain and range. Identify all holes and asymptotes.

1) $y = \dfrac{2x^2 + 5x + 3}{x + 1}$ $\dfrac{(2x+3)(x+1)}{(x+1)}$



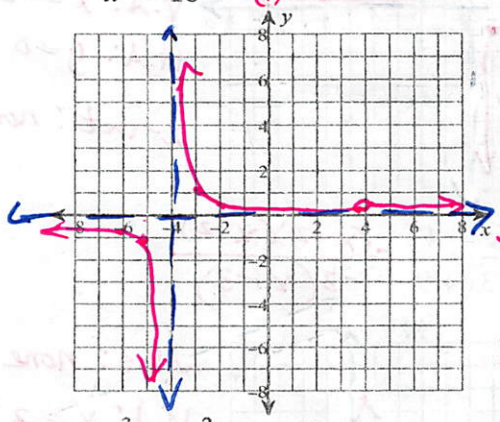
hole: $x = -1$

D: $x \neq -1$

R: $y \neq 1$

2) $y = \dfrac{x - 4}{x^2 - 16} = \dfrac{(x-4)}{(x-4)(x+4)} = \dfrac{1}{x+4}$

x	y
-3	1
-2	1/2
-5	-1
-6	-1/2



hole: $x = 4$

V.A: $x = -4$

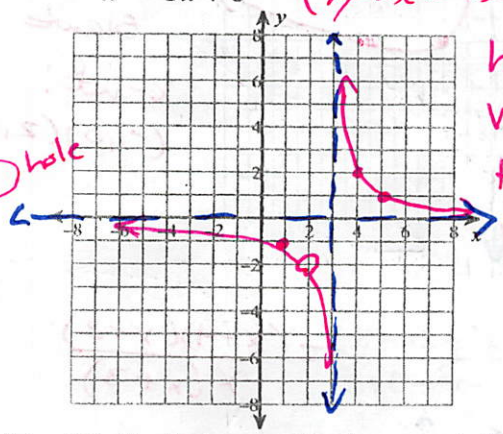
H.A: $y = 0$

D: $x \neq 4$, $x \neq -4$

R: $y \neq 0$, $y \neq \frac{1}{8}$

3) $y = \dfrac{2x - 4}{x^2 - 5x + 6} = \dfrac{2(x-2)}{(x-2)(x-3)} = \dfrac{2}{x-3}$

x	y
1	-1
2	-2
4	2
5	1



hole: $x = 2$

V.A. $x = 3$

H.A: $y = 0$

D: $x \neq 2$, $x \neq 3$

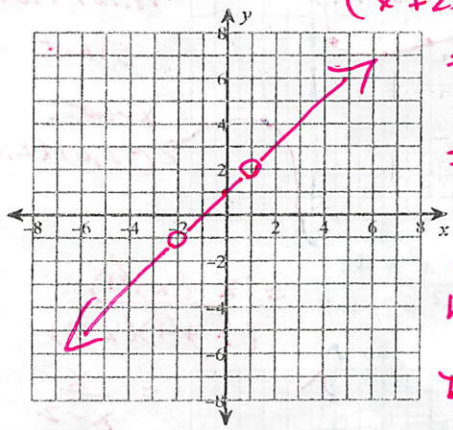
R: $y \neq 0$, $y \neq -2$

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

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

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

$= x + 1$



holes: $x = -2$, $x = 1$

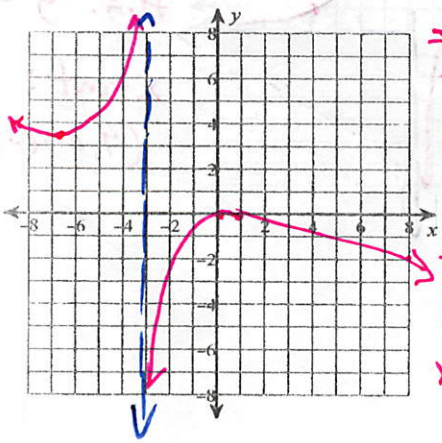
D: $x \neq -2$, $x \neq 1$

R: $y \neq 2$, $y \neq -1$

Identify the holes, vertical asymptotes, horizontal asymptotes, and x and y-intercepts of each. Then sketch the graph using Desmos.com.

5) $f(x) = \dfrac{x^3 - x}{-4x^2 - 16x - 12} = \dfrac{x(x^2-1)}{-4(x^2+4x+3)}$

$= \dfrac{x(x+1)(x-1)}{-4(x+3)(x+1)}$



hole: $x = -1$

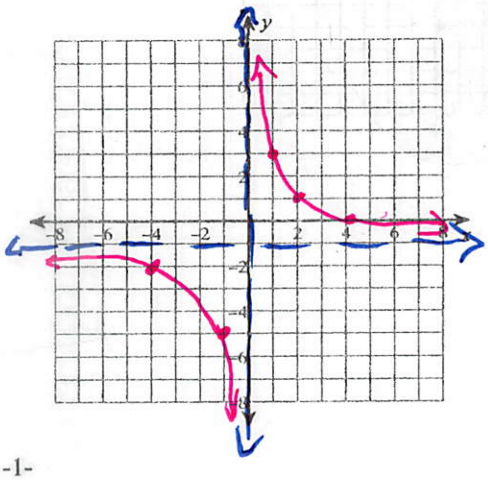
V.A: $x = -3$

H.A: none

Slant

x-int: $(0,0)$ $(1,0)$

6) $f(x) = \dfrac{-x + 4}{x}$



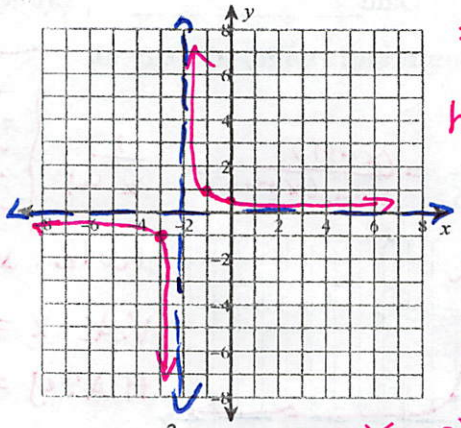
holes: none

V.A: $x = 0$

H.A: $y = -1$

x-int: $(4,0)$

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



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

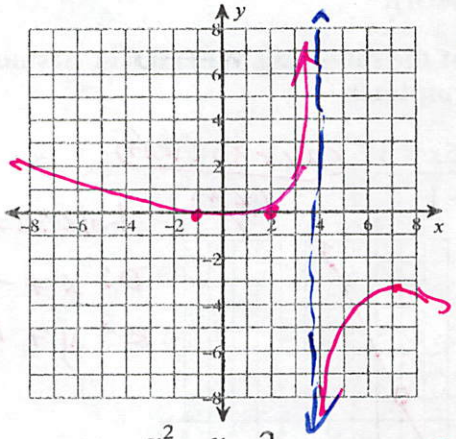
holes: $x = 1$

V.A: $x = -2$

H.A: $y = 0$

x-int: none

8) $f(x) = \dfrac{x^3 - x^2 - 2x}{-4x^2 + 16x}$ $\dfrac{x(x^2-x-2)}{-4x(x-4)} = \dfrac{x(x-2)(x+1)}{-4x(x-4)}$



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

holes: $x = 0$

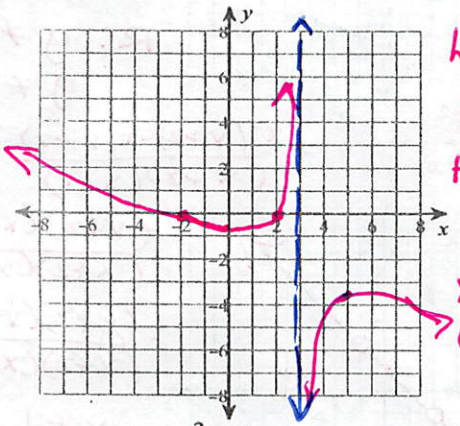
V.A: $x = 4$

H.A: none

slant

x-int: $(2,0)$ $(-1,0)$

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



holes: none

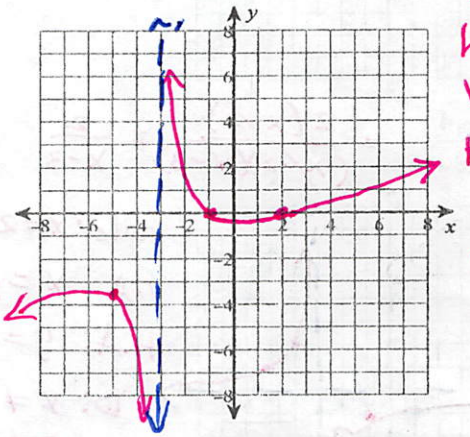
V.A: $x = 3$

H.A: none

slant

x-int: $(-2,0)$ $(2,0)$

10) $f(x) = \dfrac{x^2-x-2}{4x+12}$ $= \dfrac{(x-2)(x+1)}{4(x+3)}$



holes: none

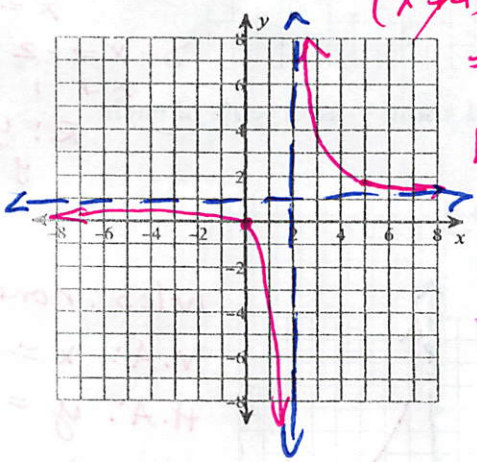
V.A: $x = -3$

H.A. none

slant

x-int: $(-1,0)$ $(2,0)$

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



$= \dfrac{x}{x-2}$

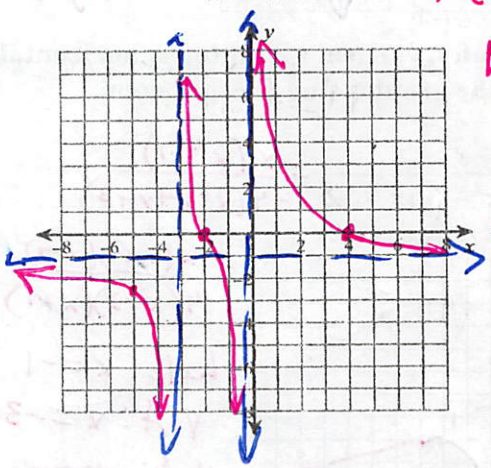
hole: $x = -4$

V.A: $x = 2$

H.A: $y = 1$

x-int $(0,0)$

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



holes: none

V.A: $x = 0$

$x = -3$

H.A: $y = -1$

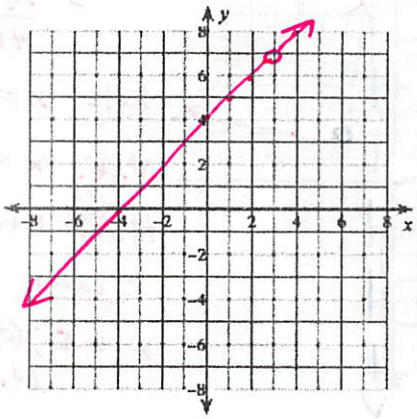
x-int:

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

Section 7.4 (Notes)

Graphing Rational Functions without a calculator:
Find the vertical and horizontal asymptotes and sketch a graph of the function:

$f(x) = \frac{x^2+x-12}{x-3}$ $= \frac{(x+4)(x-3)}{(x-3)}$

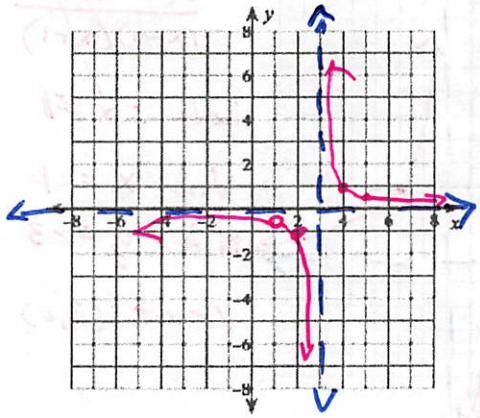


hole: $x = 3$

V.A: none

H.A: none

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



hole: $x = 1$

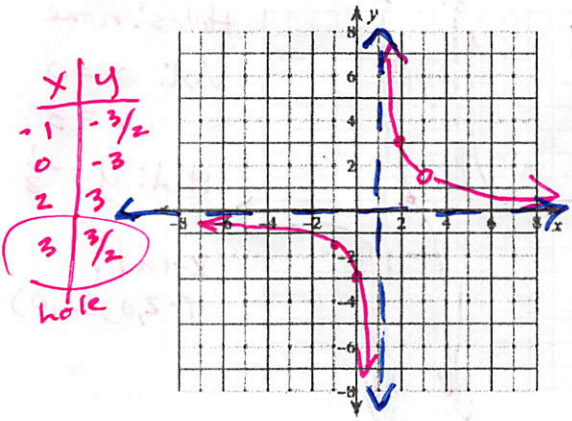
V.A: $x = 3$

H.A: $y = 0$

x	y
1	-1/2
2	-1
4	1
5	1/2

$\Rightarrow$ hole

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



x	y
-1	-3/2
0	-3
2	3
3	3/2

hole

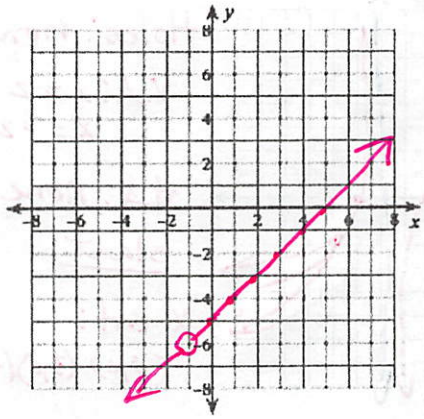
$= \frac{3}{x-1}$

hole: $x = 3$

V.A: $x = 1$

H.A: $y = 0$

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

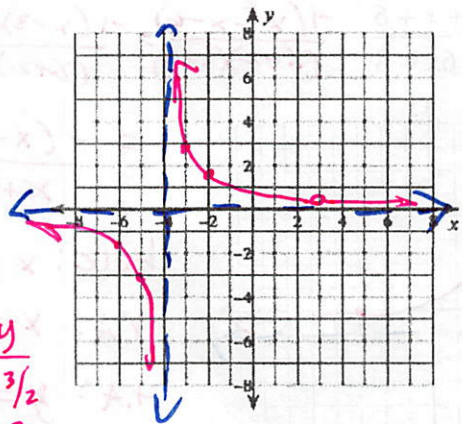


hole: $x = -1$

V.A: none

H.A: none

$f(x) = \frac{3x-9}{x^2+x-12}$ $= \frac{3(x-3)}{(x-3)(x+4)}$



x	y
-6	-3/2
-5	-3
-3	3
-2	3/2

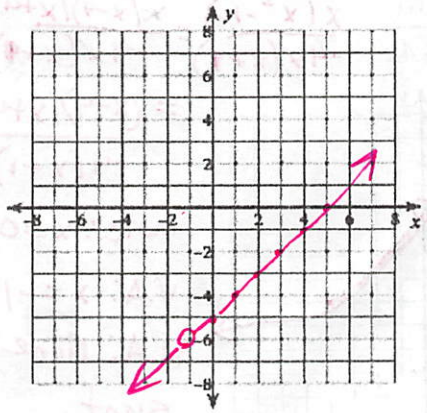
$= \frac{3}{x+4}$

hole: $x = 3$

V.A: $x = -4$

H.A: $y = 0$

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



hole: $x = -1$

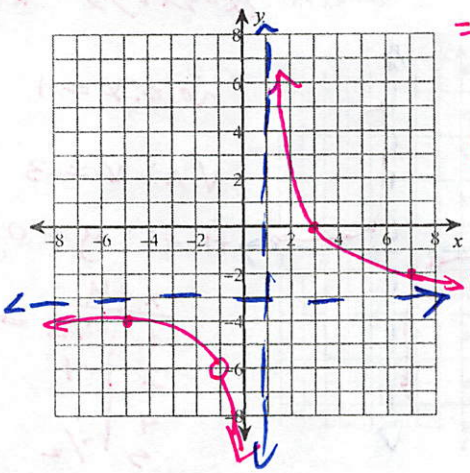
V.A: none

H.A: none

Identify the points of discontinuity, holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each. Then sketch the graph using Desmos.

1) $f(x) = \dfrac{-3x^2 + 6x + 9}{x^2 - 1} = \dfrac{-3(x^2 - 2x - 3)}{(x-1)(x+1)}$

$= \dfrac{-3(x-3)(x+1)}{(x-1)(x+1)}$



hole : $x = -1$

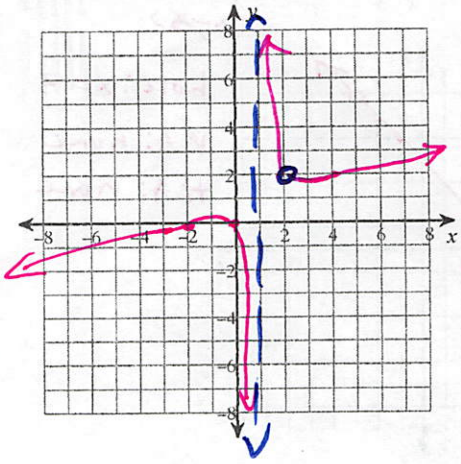
V.A: $x = 1$

H.A: $y = -3$

x-int: $(3,0)$

2) $f(x) = \dfrac{x^3 - 4x}{4x^2 - 12x + 8}$ $\dfrac{x(x^2-4)}{4(x^2-3x+2)} = \dfrac{x(x+2)(x-2)}{4(x-2)(x-1)}$

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



hole: $x = 2$

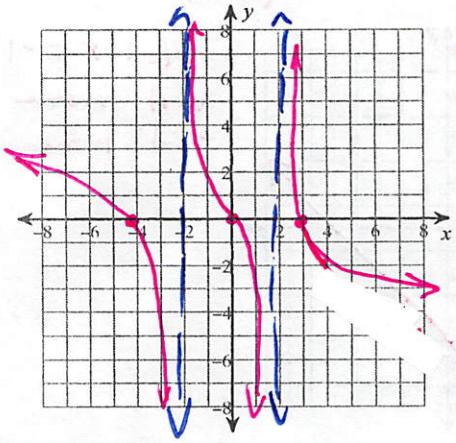
V.A: $x = 1$

H.A: none

Slant

x-int: $(0,0)$ $(0,-2)$

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



Holes: none

V.A: $x = 2$

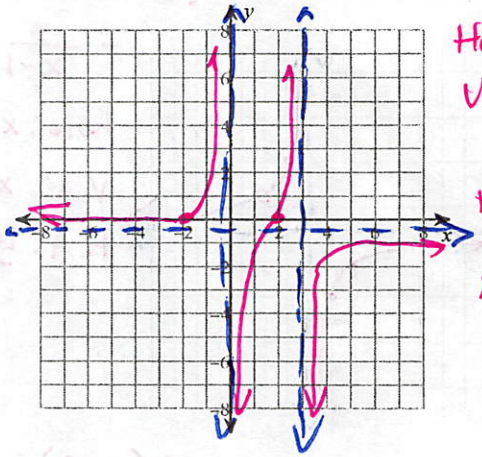
$x = -2$

H.A: none

Slant

x-int: $(0,0)$ $(3,0)$ $(-4,0)$

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



Holes: none

V.A: $x = 0$

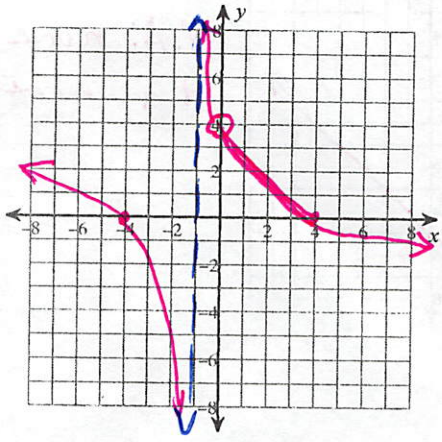
$x = 3$

H.A: $y = -\frac{1}{3}$

x-int: $(-2,0)$ $(2,0)$

5) $f(x) = \dfrac{x^3 - 16x}{-4x^2 - 4x}$ $\dfrac{x(x^2-16)}{-4x(x+1)} = \dfrac{x(x-4)(x+4)}{-4x(x+1)}$

$= \dfrac{(x-4)(x+4)}{-4(x+1)}$



hole: $x = 0$

V.A: $x = -1$

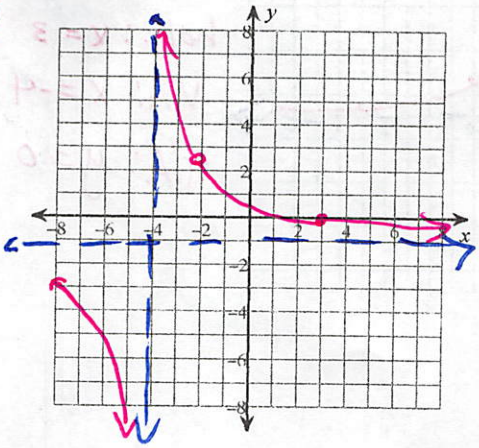
H.A: None

Slant

x-int: $(4,0)$ $(-4,0)$

6) $f(x) = \dfrac{-x^2 + x + 6}{x^2 + 6x + 8}$ $\dfrac{-1(x^2-x-6)}{(x+2)(x+4)} = \dfrac{-1(x-3)(x+2)}{(x+2)(x+4)}$

$= \dfrac{-(x-3)}{x+4}$



hole: $x = -2$

V.A: $x = -4$

H.A: $y = -1$

x-int: $(3,0)$