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Algebraic and Transcendental Functions
Review:
Operations with functions

Name: ____

ID number: ________________ Group: __________ Date: ________________

1. Combine the functions according to the indicated operation.

$f(x) = \frac{2x}{x+1}$ $g(x) = \frac{1}{x+4}$

a. Operation 1: $(f - g)(x)$

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

$$\frac{2x^2+8x-x-1}{(x+1)(x+4)} = \boxed{\frac{2x^2+7x-1}{(x+1)(x+4)} = (f-g)(x)}$$

b. Operation 2: $\left(\frac{f}{g}\right)(x)$ and state its domain.

$$\frac{\frac{2x}{x+1}}{\frac{1}{x+4}} = \frac{2x(x+4)}{x+1} = \boxed{\frac{2x^2+8x}{x+1} = \left(\frac{f}{g}\right)(x)}$$

$x+4=0$
$x=-4$
g(x) is denominator of $\left(\frac{f}{g}\right)(x)$

$x+1=0$
$x=-1$
"x + 1" is the final denominator

Domain
$(-\infty,-4)\cup(-4,-1)\cup(-1,\infty)$

c. Operation 3: $(f * g)(x)$

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

d. Operation 4: $(f + g)(3)$

$$\frac{2x}{x+1} + \frac{1}{x+4} = \frac{2(3)}{3+1} + \frac{1}{3+4} = \frac{6}{4} + \frac{1}{7} = \frac{42}{28} + \frac{4}{28} = \frac{46}{28} = \frac{23}{14}$$

$$\boxed{(f+g)(3) = \frac{23}{14}}$$

2. Combine the functions that model a real-life situation.

a. A small publishing company is releasing a new book. The production costs will include a one-time fixed cost for editing and an additional cost for each book printed. The total production cost C (in dollars) is given by the function $C = 19.95N + 750$, where N is the number of books.

The total revenue earned (in dollars) from selling the books is given by the function $R = 31.9N$.

Write an equation for the profit made (in dollars), that relates C with R in terms of N. Simplify as much as possible.

Profit = revenue − cost = $31.9N - (19.95N + 750)$

$(R-C)(N) = 31.9N - 19.95N - 750$

$\boxed{(R-C)(N) = 11.95N - 750}$

b. A car rental company's standard charge includes an initial fee plus an additional fee for each mile driven. The standard charge S (in dollars) is given by the function $S = 17.75 + 0.4M$, where M is the number of miles driven.

The company also offers an option to insure the car against damage. The insurance charge I (in dollars) is given by the function $I = 3.9 + 0.15M$.

Write an equation for the total charge (in dollars) for a rental that includes insurance. The equation must relate S to I in terms of M.

$(S+I)(M) = 17.75 + 0.4M + 3.9 + 0.15M$

$\boxed{(S+I)(M) = 21.65 + 0.55M}$

Review:
Linear, Quadratic, and Absolute Value Traslations

1. Consider the function $y = \sqrt{x}$. Describe the transformations made in the graph of $y = 2\sqrt{x+3} - 1$.

Horizontal translation 3 units left.

Vertical stretch by a factor of 2.

Vertical translation 1 unit down.

2. Consider the function $y = |x|$. Describe the transformations made in the graph of $y = -|x-4| - 2$.

Horizontal translation 4 units right.

Vertical translation 2 units down.

Reflection on x-axis.

3. Consider the function $y = x^2$. Describe the transformations made in the graph of $y = 3(-x-1)^2 + 4$.

Horizontal translation 1 unit left.

Vertical stretch by a factor of 3.

Vertical translation 4 units up.

Reflection on y-axis.

4. Consider the function $y = |x|$. Describe the transformations made in the graph of $y = -3|x| + 4$.

Vertical stretch by a factor of 3.

Vertical translation 4 units upward.

Reflection on the x-axis.

Review:

Composition of functions

1. For each of the following pair of functions, find the indicated composition.

Functions:

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

a. $\boxed{(f \circ g)\left(\frac{1}{2}\right) = -6}$

$$\frac{2}{\frac{4}{x+1} - 3} = \frac{2}{\frac{4}{\frac{1}{2}+1} - 3} = \frac{2}{\frac{4}{\frac{3}{2}} - 3} = \frac{2}{\frac{8}{3} - \frac{9}{3}} = \frac{2}{-\frac{1}{3}} = -6$$

b. $\boxed{(f \circ f)(5) = -1}$

$$\frac{2}{\frac{2}{x-3} - 3} = \frac{2}{\frac{2}{5-3} - 3} = \frac{2}{\frac{2}{2} - 3} = \frac{2}{1-3} = \frac{2}{-2} = -1$$

Functions:
$f(x) = \sqrt{2-x}$ $\qquad$ $g(x) = x^2 - 4$

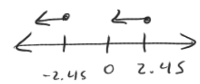
a. $(f \circ g)(x)$ and its domain

$f(g(x)) = \sqrt{2-(x^2-4)} = \sqrt{2-x^2+4} = \sqrt{-x^2+6}$

$\boxed{(f \circ g)(x) = \sqrt{-x^2+6}}$

$\boxed{\text{Domain } (-\infty, -2.45]}$

$-x^2+6 \geq 0$
$-x^2 \geq -6$
$x^2 \leq 6$
$x \leq \pm\sqrt{6}$
$x \leq 2.45$
$x \leq -2.45$



b. $(g \circ f)(x)$ and its domain

$g(f(x)) = (\cancel{\sqrt{}}\,2-x)^{\cancel{2}} - 4 = 2 - x - 4 = -x - 2$

$\boxed{(g \circ f)(x) = -x-2}$

$\boxed{\text{Domain } (-\infty, 2]}$

$2 - x \geq 0$
$-x \geq -2$
$x \leq 2$

Review:
Inverse Function

1. Determine algebraically whether the two given functions are the inverse of each other or not. Justify your answer with $f(g(x))$, and $g(f(x))$.

a. Functions:

$$f(x) = \frac{2}{x-8} \qquad g(x) = \frac{2}{x} + 8$$

$f(g(x)) =$

$= \dfrac{2}{\left(\frac{2}{x}+8\right)-8}$

$= \dfrac{2}{\frac{2}{x} \cancel{+8} \cancel{-8}}$

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

$= \dfrac{\frac{\cancel{2}}{1}}{\frac{\cancel{2}}{x}}$

$= x$

$\boxed{f(g(x)) = x}$

$g(f(x)) =$

$= \dfrac{2}{\frac{2}{x-8}} + 8$

$= \dfrac{\frac{\cancel{2}}{1}}{\frac{\cancel{2}}{x-8}} + 8$

$= x \cancel{-8} \cancel{+8}$

$= x$

$\boxed{g(f(x)) = x}$

Yes, they are inverse functions

b. Functions:

$$f(x) = x^2 + 3 \qquad g(x) = 2x - 3$$

$f(g(x)) =$

$= (2x-3)^2 + 3$

$= 4x^2 - 12x + 9 + 3$

$= 4x^2 - 12x + 12$

$= 4(x^2 - 3x + 3)$

$\boxed{f(g(x)) = 4x^2 - 12x + 12}$

$g(f(x)) =$

$= 2(x^2+3) - 3$

$= 2x^2 + 6 - 3$

$= 2x^2 + 3$

$\boxed{g(f(x)) = 2x^2 + 3}$

Not inverse functions

c. Functions:

$$f(x) = 1 - x^3 \qquad g(x) = \sqrt[3]{1-x}$$

$f(g(x)) = 1 - (\cancel{\sqrt[3]{1-x}})^{\cancel{3}}$

$= 1 - (1-x)$

$= \cancel{1} - \cancel{1} + x$

$= x$

$\boxed{f(g(x)) = x}$

$g(f(x)) =$

$= \sqrt[3]{1-(1-x^3)}$

$= \sqrt[3]{\cancel{1} - \cancel{1} + x^3}$

$= \cancel{\sqrt[3]{x^{3}}}$

$= x$

$\boxed{g(f(x)) = x}$

Yes, they are inverse functions

d. Functions:

$$f(x) = \frac{x}{2} - 5 \qquad g(x) = 2x + 5$$

$f(g(x)) =$

$= \frac{2x+5}{2} - 5$

$= \frac{2x+5}{2} - \frac{10}{2}$

$= \frac{2x+5-10}{2}$

$= \frac{2x-5}{2}$

$= \frac{2x}{2} - \frac{5}{2}$

$= x - \frac{5}{2}$

$\boxed{f(g(x)) = x - \frac{5}{2}}$

$g(f(x)) =$

$= 2\left(\frac{x}{2} - 5\right) + 5$

$= \frac{2x}{2} - 10 + 5$

$= x - 5$

$\boxed{g(f(x)) = x - 5}$

Not inverse functions

3. State the domain and range of the following functions. Then, find the inverse function, its domain, and its range.

a. $f(x) = \sqrt{5 - x}$

domain: $(-\infty, 5]$

range: $[0, \infty)$

$f(x) = \sqrt{5 - x}$

$y = \sqrt{5 - x}$

$x = \sqrt{5 - y}$

$x^2 = 5 - y$

$x^2 - 5 = -y$

$y = -x^2 + 5$

Domain

$5 - x = 0$

$-x = -5$

$x = 5$

Range

$y = 0$

Inverse function: $f^{-1}(x) = -x^2 + 5$

Domain of $f^{-1}(x)$: $[0, \infty)$

Range of $f^{-1}(x)$: $(-\infty, 5]$

b. $f(x) = x^2 + 4; x \geq 0$

domain: $[0, \infty)$

range: $[4, \infty)$

$f(x) = x^2 + 4$

$y = x^2 + 4$

$x = y^2 + 4$

$x - 4 = y^2$

$\sqrt{x - 4} = y$

Inverse function: $f^{-1}(x) = \sqrt{x - 4}$

Domain of $f^{-1}(x)$: $[4, \infty)$

Range of $f^{-1}(x)$: $[0, \infty)$

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

domain: $(-\infty, 2) \cup (2, \infty)$

range: $(-\infty, 1) \cup (1, \infty)$

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

$y = \frac{x+1}{x-2}$

$x = \frac{y+1}{y-2}$

$x(y-2) = y + 1$

$xy - 2x = y + 1$

$xy - y = 1 + 2x$

$y(x-1) = 1 + 2x$

$y = \frac{1+2x}{x-1}$

Domain

$x - 2 = 0$

$x = 2$

Not in domain

Range

$\frac{x+1}{x-2}$

same degree

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

Not in range

Inverse function: $g^{-1}(x) = \frac{1+2x}{x-1}$

Domain of $g^{-1}(x)$: $(-\infty, 1) \cup (1, \infty)$

Range of $g^{-1}(x)$: $(-\infty, 2) \cup (2, \infty)$

5. Graph: the given function, its inverse, and the reflection line.

a. $f(x) = -\frac{2}{3}x - 1$

$$y = -\frac{2}{3}x - 1$$

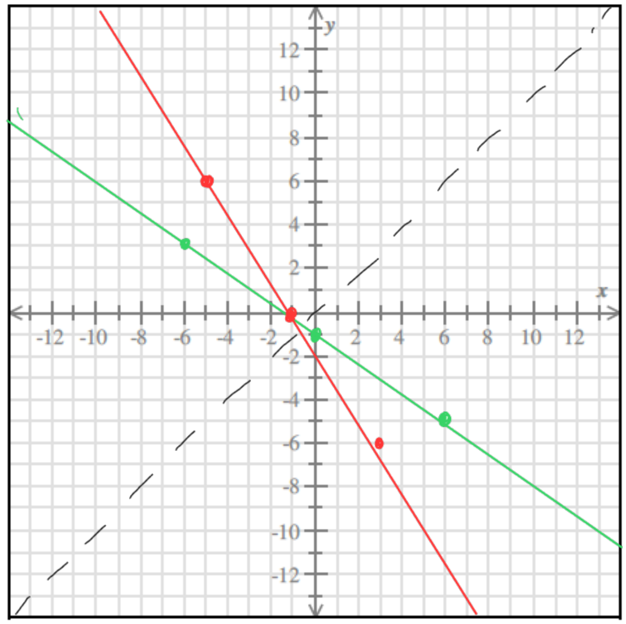
$$x = -\frac{2}{3}y - 1$$

$$x + 1 = -\frac{2}{3}y$$

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

$$-\frac{3}{2}x - \frac{1}{2} = y$$

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



x	y
-6	3
0	-1
6	-5

x	y
3	-6
-1	0
-5	6

b. $f(x) = (x-1)^2 - 2, x \geq 1$

$$y = (x-1)^2 - 2$$

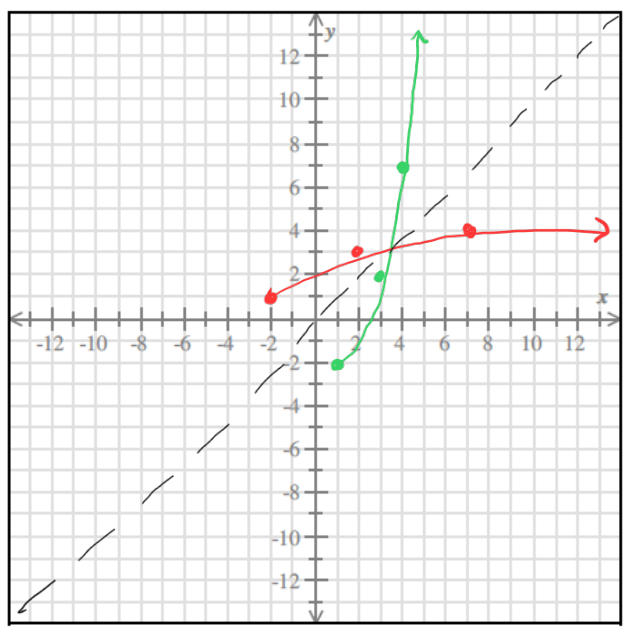
$$x = (y-1)^2 - 2$$

$$x + 2 = (y-1)^2$$

$$\sqrt{x+2} = y - 1$$

$$\sqrt{x+2} + 1 = y$$

$$\boxed{f^{-1}(x) = \sqrt{x+2} + 1}$$



x	y
1	-2
3	2
4	7

x	y
-2	1
2	3
7	4

Review:
Piecewise Functions

1. Graph the following piecewise functions, determine the domain and range.

a. $f(x) = \begin{cases} -2x+3; & x \le 0 \\ 2; & 0 < x \le 2 \\ (x-3)^2+1; & x > 2 \end{cases}$

linear ↘ $(-\infty, 0]$
linear → $(0, 2]$
quadratic ∪ $(2, \infty)$

x	y
-4	11
0	3

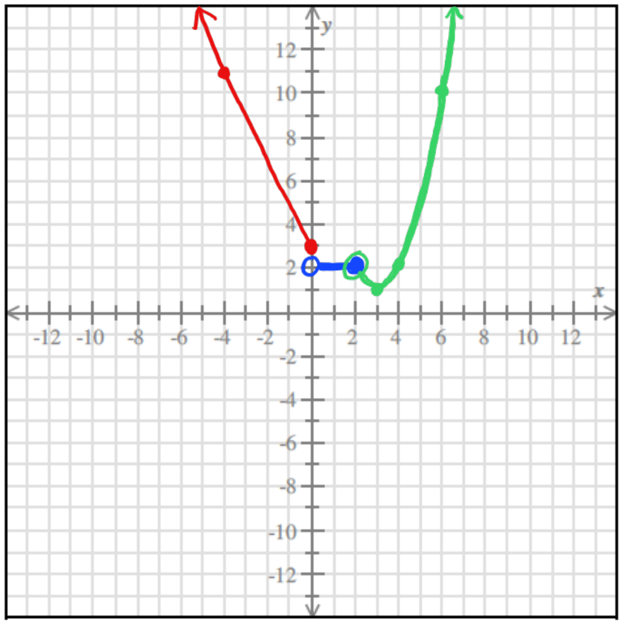
$y=-2(-4)+3$
$=8+3=11$
$y=-2(0)+3$
$=0+3=3$

x	y
0	2
1	2
2	2

$y=2$

x	y
2	2
3	1
4	2
6	10

$y=(2-3)^2+1$
$=(-1)^2+1=1+1=2$
$y=(3-3)^2+1$
$=0^2+1=1$
$y=(4-3)^2+1$
$=1^2+1=2$
$y=(6-3)^2+1$
$=3^2+1=9+1=10$



$D=(-\infty, \infty)$
$R=[1, \infty)$

b. $f(x) = \begin{cases} -3; & x < -1 \\ x^2-1; & -1 \le x < 1 \\ \frac{1}{x-2}; & x \ge 1 \end{cases}$

linear → $(-\infty, -1)$
quadratic ∪ $[-1, 1)$
rational $[1, \infty)$

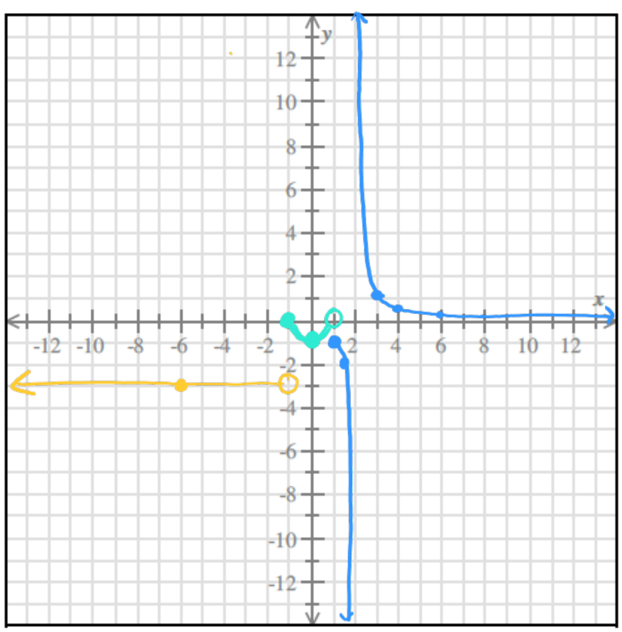
x	y
-6	-3
-1	-3

x	y
-1	0
0	-1
1	0

$y=(-1)^2-1$
$=1-1=0$
$y=(0)^2-1$
$=-1$
$y=1^2-1$
$=0$

x	y
1	-1
1.5	-2
2	undef.
3	1
4	0.5
6	0.25
8	$0.1\overline{6}$

$y=\frac{1}{1-2}=\frac{1}{-1}=-1$
$y=\frac{1}{1.5-2}=\frac{1}{-.5}$
$=\frac{1}{-\frac{1}{2}}=-2$
$y=\frac{1}{2-2}=\frac{1}{0}=$ undef.
$y=\frac{1}{3-2}=\frac{1}{1}=1$
$y=\frac{1}{4-2}=\frac{1}{2}=0.5$
$y=\frac{1}{6-2}=\frac{1}{4}=0.25$
$y=\frac{1}{8-2}=\frac{1}{6}=0.1\overline{6}$



$D=(-\infty, \infty)$
$R=(-\infty, 0) \cup (0, \infty)$

c. $f(x) = \begin{cases} -3; & x \le 5 \\ -2x; & x > 5 \end{cases}$ linear → $(-\infty, 5]$; linear ↘ $(5, \infty)$

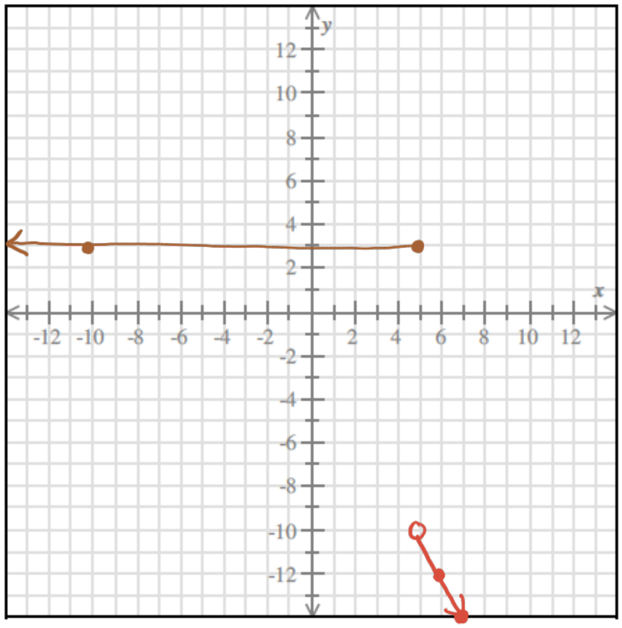
x	y
-10	-3
5	-3

x	y
5	-10
6	-12
7	-14

$y = -2(5) = -10$

$y = -2(6) = -12$

$y = -2(7) = -14$



d. $h(x) = \begin{cases} 1 - x; & x < -2 \\ x^2 - 1; & -2 \le x < 2 \\ \frac{1}{x-1}; & x \ge 2 \end{cases}$ linear ↘ $(-\infty, -2)$; quadratic ∪ $[-2, 2)$; rational $[2, \infty)$

x	y
-8	9
-2	3

x	y
-2	3
0	-1
2	3

x	y
2	1
3	0.5
4	$0.\overline{33}$
6	0.2
8	0.14

$y = 1 - (-8) = 9$

$y = 1 - (-2) = 3$

$y = (-2)^2 - 1 = 3$

$y = (0)^2 - 1 = -1$

$y = (2)^2 - 1 = 3$

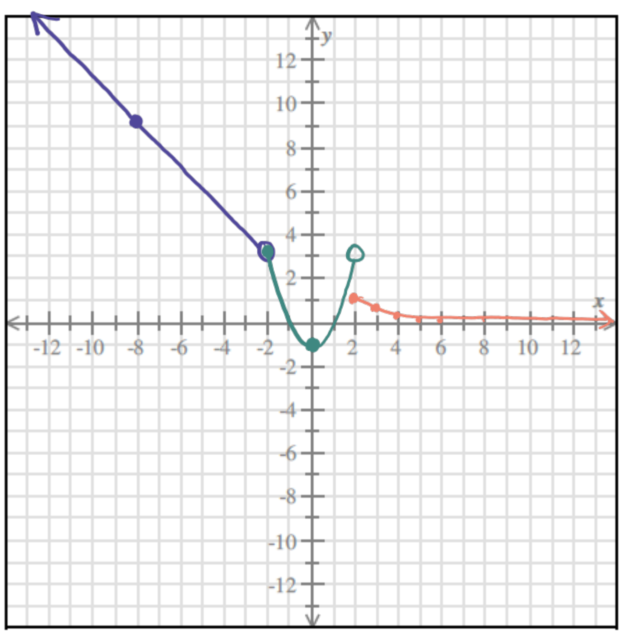
$y = \frac{1}{2-1} = \frac{1}{1}$

$y = \frac{1}{3-1} = \frac{1}{2}$

$y = \frac{1}{4-1} = \frac{1}{3}$

$y = \frac{1}{6-1} = \frac{1}{5}$

$y = \frac{1}{8-1} = \frac{1}{7}$



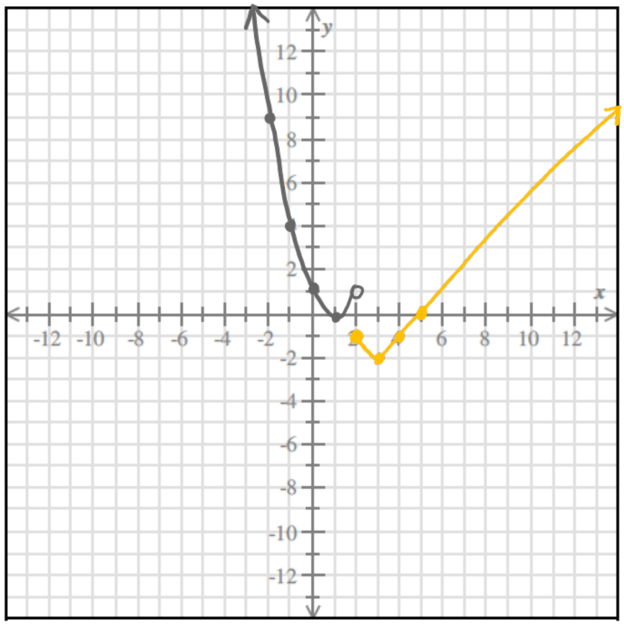
e. $f(x) = \begin{cases} (x-1)^2; & x < 2 \\ |x-3| - 2; & x \geq 2 \end{cases}$ quadratic ∪ $(-\infty, 2)$ / absolute value ∨ $[2, \infty)$

x	y
−2	9
−1	4
0	1
1	0
2	1

$y=(-2-1)^2=(-3)^2$
$y=(-1-1)^2=(-2)^2$
$y=(0-1)^2=(-1)^2$
$y=(2-1)^2=1^2$

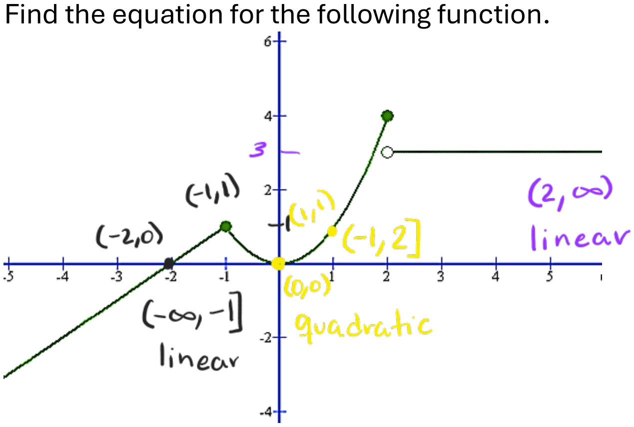
x	y
2	−1
3	−2
4	−1
5	0

$y=|2-3|-2=|-1|-2$
$=1-2=-1$
$y=|4-3|-2=|1|-2=-1$
$y=|5-3|-2=|2|-2=0$



3. Find the equation for the following function.

a.



$m=\frac{y_2-y_1}{x_2-x_1}=\frac{1-0}{-1+2}=\frac{1}{1}=1$

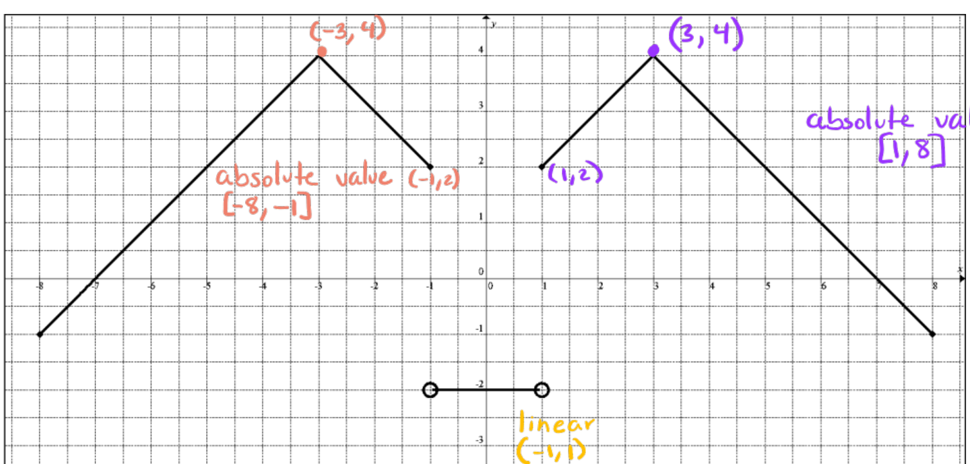
$y=1x+b$
$1=1(-1)+b$
$1=-1+b$
$1+1=b$
$2=b$

$y=3$

$y=a(x-0)^2+0$
$y=ax^2$
$1=a(1)^2$
$\frac{1}{1}=a$
$a=1$

$$\boxed{f(x)=\begin{cases} x+2; & x \leq -1 \\ x^2; & -1 < x \leq 2 \\ 3; & x > 2 \end{cases}}$$

b.



$y=a|x+3|+4$
$2=a|-1+3|+4$
$2=a|2|+4$
$2-4=a(2)$
$-2=a(2)$
$a=-1$

$y=-2$

$y=a|x-3|+4$
$2=a|1-3|+4$
$2=a|-2|+4$
$2-4=a(2)$
$-2=a(2)$
$a=-1$

$$\boxed{S(x)=\begin{cases} -|x+3|+4; & -8 \leq x \leq -1 \\ -2; & -1 < x < 1 \\ -|x-3|+4; & 1 \leq x \leq 8 \end{cases}}$$

Review:
Rational Functions

1. Select the option that best fits the statement.

1. A Is a rational function that has the following lines as asymptotes: $x = 4$ and $y = 3$.

a) $f(x) = \frac{3x}{x-4}$ b) $f(x) = \frac{3x}{x+4}$ c) $f(x) = \frac{x-3}{x-4}$ d) $f(x) = \frac{4x}{x-3}$

2. D The asymptotes of the rational function $f(x) = \frac{2x^2-10x+12}{x^2-9}$ are: $\frac{2(x^2-5x+6)}{(x-3)(x+3)} = \frac{2\cancel{(x-3)}(x-2)}{\cancel{(x-3)}(x+3)} = \frac{2(x-2)}{x+3}$

hole

a) $y = 2, x = 3, x = -3$ b) $y = 2, x = 3$

c) $y = 0, x = 3, x = -3$ d) $y = 2, x = -3$

3. C Which of the following is the rational function with asymptotes in the lines $x = 3, x = -1$, and $y = 0$; with the x- intercept in (2,0), and the y- intercept in $\left(0, \frac{2}{3}\right)$?

a) $f(x) = \frac{x-2}{x^2-2x+3}$ Not factorizable b) $f(x) = \frac{3x-2}{x^2-2x+3}$ Not factorizable c) $f(x) = \frac{x-2}{x^2-2x-3}$ $x-2=0$ $x=2$ $(x+1)(x-3)$ d) $f(x) = \frac{2x-3}{x^2-2x-3}$ $(x+1)(x-3)$ $2x-3=0$ $2x=-3$ $x=\frac{-3}{2}$

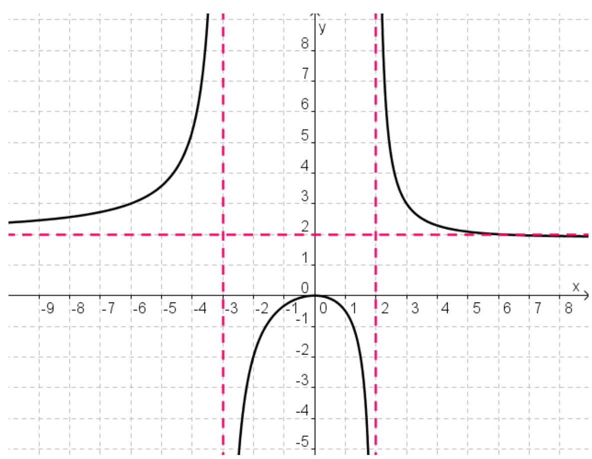
4. B The rational function that corresponds to the graphic representation is:

a) $f(x) = \frac{x-2}{x^2+x-6}$ $y=0$

b) $f(x) = \frac{2x^2}{x^2+x-6}$ $y=2$ $(x-2)(x+3)$ $x=2$ $x=-3$

c) $f(x) = \frac{2x}{x^2+x-6}$ $y=0$

d) $f(x) = \frac{2x^2}{x^2-x-6}$ $y=2$ $(x+2)(x-3)$ $x=-2$ $x=3$



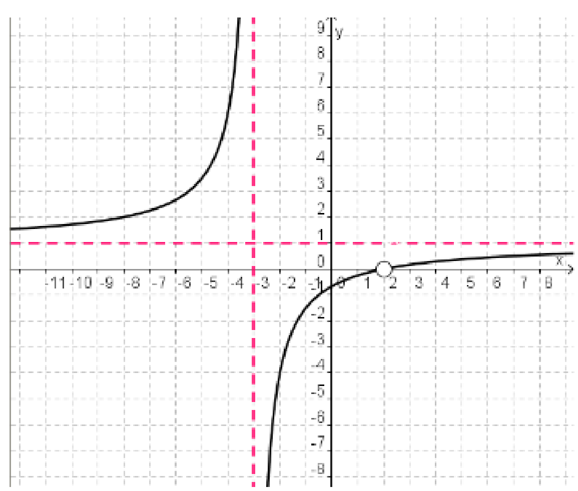
5. C The rational function that corresponds to the graphic representation is:

a) $f(x) = \frac{x}{x-3}$ $y=1$ $x=3$

b) $f(x) = \frac{x}{x+3}$ $y=1$ $x=-3$ hole?

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

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



c) $\frac{x^2-4x+4}{x^2+x-6} = \frac{(x-2)^{\cancel{2}}}{\cancel{(x-2)}(x+3)} =$

$\boxed{\text{hole } (2,0)}$ $x=2$ $y=0$ $y=\frac{2-2}{2+3}=$ $y=\frac{0}{5}=0$

$\frac{x-2}{x+3}$ $x=-3$

d) $\frac{x^2+4x+4}{x^2-x-6} = \frac{(x+2)^{\cancel{2}}}{\cancel{(x+2)}(x-3)}$

hole $x=-2$

4. Given the following functions find the vertical and horizontal asymptotes, the empty point (hole), and the x and y intercepts. Then, graph the function and state its domain and range.

a) $y = \frac{2x-4}{2x^2+x-10} = \frac{2(\cancel{x-2})}{(2x+5)(\cancel{x-2})} = \frac{2}{2x+5}$ $y=0$

$2x+5=0$
$2x=-5$
$x=\frac{-5}{2}$

VA: $x=-\frac{5}{2}$

HA: $y=0$

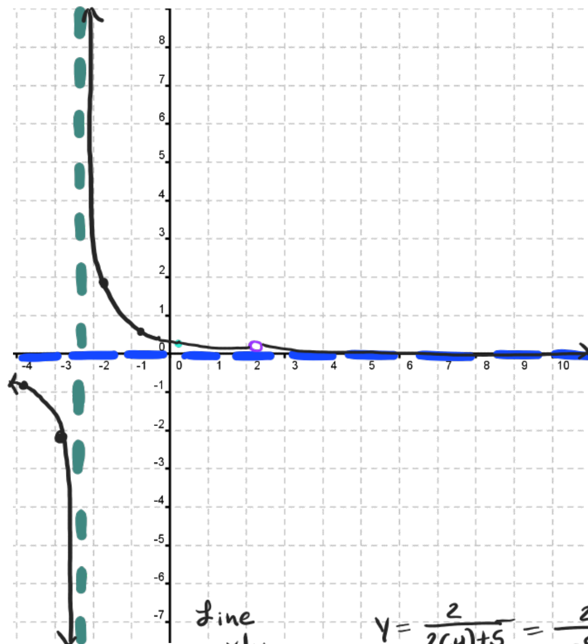
"Y" intercept: $(0, 0.4)$

"X" intercept: None

Hole: $(2, 0.\overline{2})$

Domain: $(-\infty,-2.5)\cup(-2.5,2)\cup(2,\infty)$

Range: $(-\infty,0)\cup(0,0.\overline{2})\cup(0.\overline{2},\infty)$



Hole
$y=\frac{2}{2(2)+5}=\frac{2}{4+5}=\frac{2}{9}=0.\overline{2}$

y-int. $x=0$
$y=\frac{2}{2(0)+5}=\frac{2}{5}=0.4$

Line

x	y
-4	$-0.\overline{6}$
-3	-2
-2	2
-1	$0.\overline{6}$

$y=\frac{2}{2(-4)+5}=\frac{2}{-8+5}=\frac{2}{-3}=-0.6\overline{6}$
$y=\frac{2}{2(-3)+5}=\frac{2}{-6+5}=\frac{2}{-1}=-2$
$y=\frac{2}{2(-2)+5}=\frac{2}{-4+5}=\frac{2}{1}=2$
$y=\frac{2}{2(-1)+5}=\frac{2}{-2+5}=\frac{2}{3}=0.\overline{6}$

b) $y = \frac{3x^2}{x^2-9} = \frac{3x^2}{(x+3)(x-3)}$ $y=3$ $x=3$, $x=-3$

VA: $x=3$ and $x=-3$

HA: $y=3$

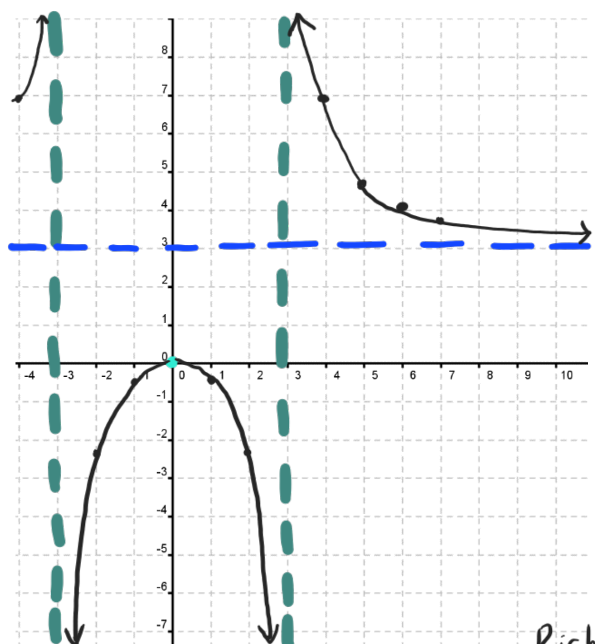
"Y" intercept: $(0,0)$

"X" intercept: $(0,0)$

Hole: None

Domain: $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$

Range: $(-\infty,0)\cup(3,\infty)$



y-int. $x=0$
$y=\frac{3(0)^2}{0^2-9}=\frac{0}{-9}=0$

Left side

x	y
-4	6.9
-3.5	11.3

$y=\frac{3(-4)^2}{(-4)^2-9}$
$y=\frac{3(-3.5)^2}{(-3.5)^2-9}$

Middle

x	y
-2	-2.4
-1	-0.4
1	-0.4
2	-2.4

Right side

x	y
4	6.9
5	4.7
6	4
7	3.7

c) $y = \frac{4-2x}{x-5} = \frac{2(2-x)}{x-5}$

VA: $x=5$

HA: $y=-2$

"Y" intercept: $(0,-0.8)$

"X" intercept: $(2,0)$

Hole: None

Domain: $(-\infty,5)\cup(5,\infty)$

Range: $(-\infty,-2)\cup(-2,\infty)$

x-int $y=0$

$2-x=0$

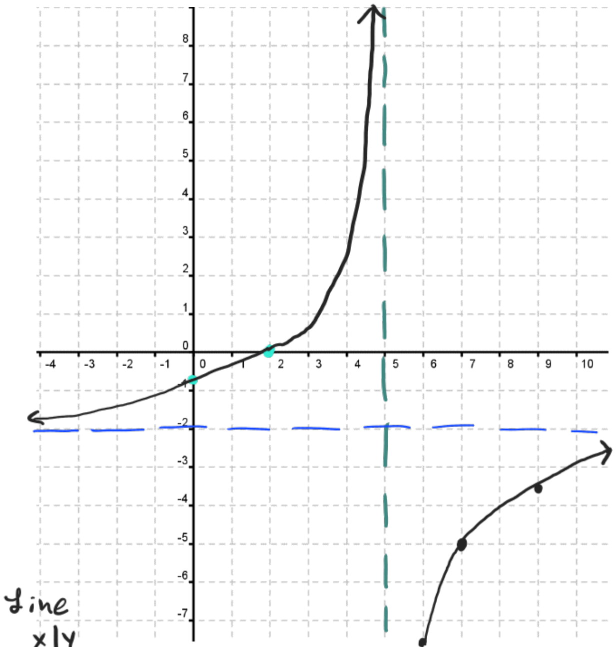
$-x=-2$

$x=2$

y-int $x=0$

$y=\frac{2(2-0)}{(0-5)}=\frac{2(2)}{-5}$

$y=-\frac{4}{5}$



line

x	y
6	-8
9	-3.5
7	-5

d) $y = \frac{x^2-4x}{x^2+x-20} = \frac{x\cancel{(x-4)}}{(x+5)\cancel{(x-4)}} = \frac{x}{x+5}$

VA: $x=-5$

HA: $y=1$

"Y" intercept: $(0,0)$

"X" intercept: $(0,0)$

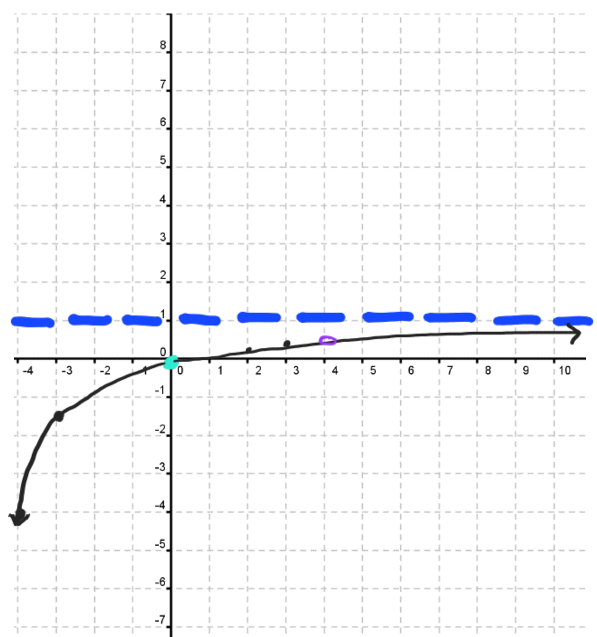
Hole: $(4,0.\overline{4})$

Domain: $(-\infty,-5)\cup(-5,4)\cup(4,\infty)$

Range: $(-\infty,0.\overline{4})\cup(0.\overline{4},1)\cup(1,\infty)$

hole

$y=\frac{4}{4+5}=\frac{4}{9}=0.4\overline{4}$



x	y
-4	-4
-3	-1.5
2	0.3
3	0.4