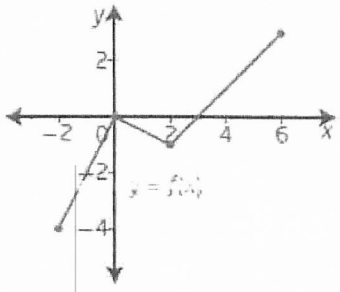
Final Exam Review (AK)

Outcome 1A Review

Level 2

1. Consider the graph of $y = f(x)$.

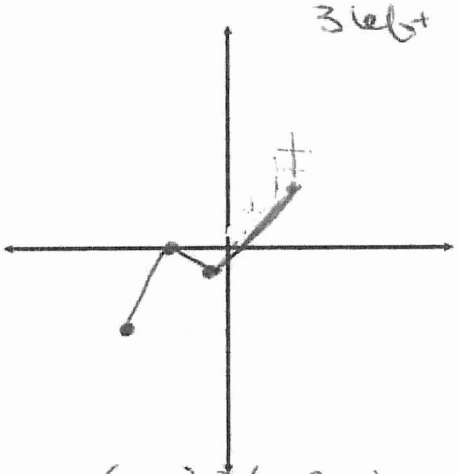


a) Sketch each of the transformed function:

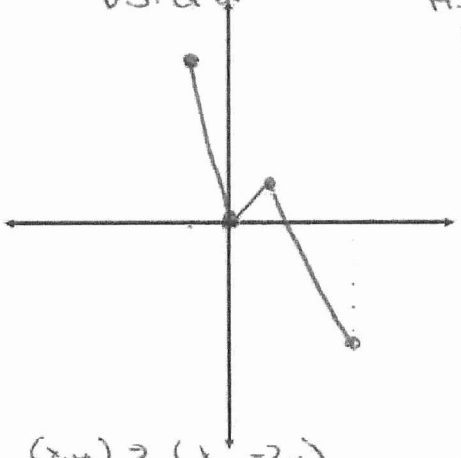
i) $y = f(x+3)$ — 3 left

ii) $y = -2f(x)$ — V. reflection about x-axis, V.S. of 2

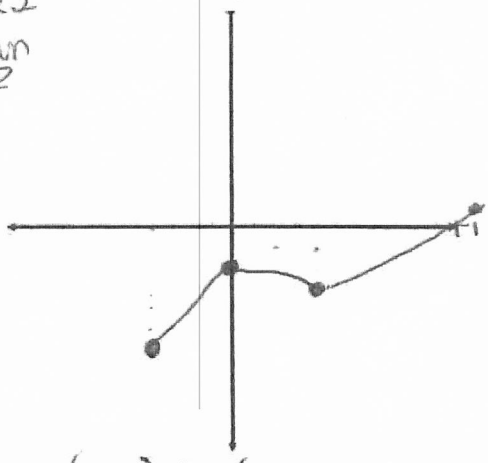
iii) $y = f(\frac{1}{2}x) - 2$ — H.S x2, Down 2



$(x, y) \to (x-3, y)$



$(x, y) \to (x, -2y)$



$(x, y) \to (2x, y-2)$

2. For each equation, describe how the graph was translated, reflected or stretched.

a) $y = -2f(3(x-4))$

V. stretch factor of 2

V. reflection about x axis

H. stretch factor of $\frac{1}{3}$

H. translation 4 right

b) $y = f(x-5)-3$

H. translation 5 right

V. translation 3 down

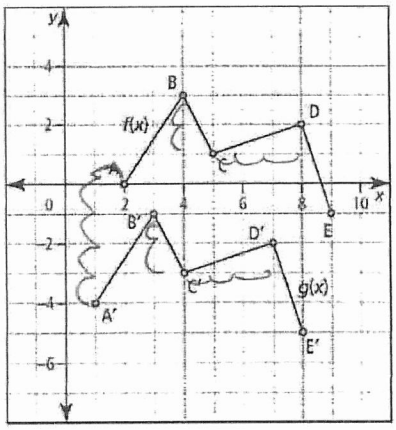
c_ $y = f(-2x)+5$

H. stretch factor $\frac{1}{2}$

H. reflection about y-axis

V. translation 5 ~~down~~ up

3. Consider the graph of $y = f(x)$ and $y = g(x)$.



Determine the equation of the translated function in the form

$y = af(b(x-h)) + k.$

$\boxed{y = f(x+1) - 4}$

4 down $\Rightarrow k = -4$

1 left $\Rightarrow h = -1$

no V. or H stretch.

5. Determine algebraically the equation of the inverse of each function.

a) $f(x)=3x-6$

$x = 3y - 6$

$x + 6 = 3y$

$y = \frac{x+6}{3}$

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

b) $f(x)=x^2-7$

$x = y^2 - 7$

$x + 7 = y^2$

$y = \pm\sqrt{x+7}$

c) $y=(x-5)^2-9$

$x = (y-5)^2 - 9$

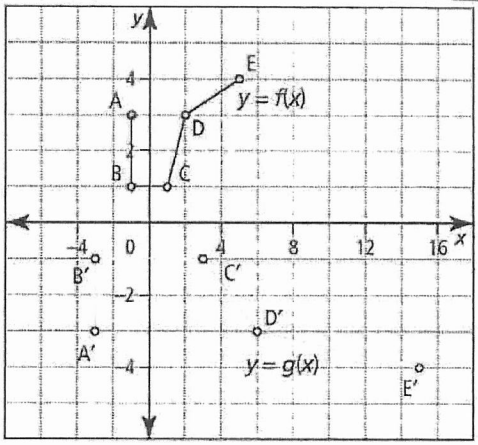
$\pm\sqrt{x+9} = \sqrt{(y-5)^2}$

$y - 5 = \pm\sqrt{x+9}$

$\boxed{y = \pm\sqrt{x+9} + 5}$

Level 3

6. Describe the transformation that must be applied to the graph of $f(x)$ to obtain the graph of $g(x)$. Then, determine an equation for $g(x)$.



$(x, y) \rightarrow (3x, -y)$

V. reflection

$a \Rightarrow -ve$

H. stretch $\times 3$

$b = \frac{1}{3}$

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

7. Write the equation for each transformation of $y = x^2$ in the form $y = af(b(x-h)) + k$.

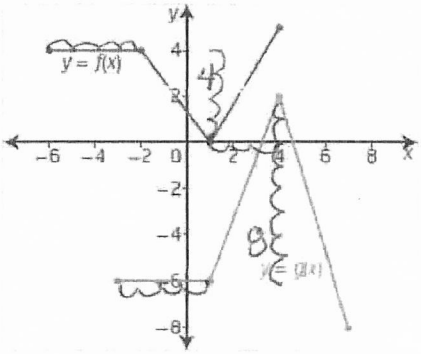
a) a vertical stretch by a factor of 3, reflected in the y-axis, and translated 3 units left and 2 units down

$y = 3f(-(x+3)) - 2$

b) a horizontal stretch by a factor of 2, reflected in the x-axis, and translated 7 units up

$y = -f(\frac{1}{2}x) + 7$

9. The graph of the function $y = g(x)$ represents a transformation of the graph of $y = f(x)$. Determine the equation of $g(x)$ in the form $y = af(b(x-h)) + k$.



$\boxed{y = -2f(x-3) + 2}$

V. reflection

$a \Rightarrow -ve$

no H stretch

V. stretch $\times 2$

3 right, 2 up.

10. The key point (−18, 12) is on the graph of $y = f(x)$. What is its image point under each transformation of the graph of $f(x)$?

a) $-3f(x+5)+4$

$(x,y) \to (x-5, -3y+4)$

$(-18,12) \to (-18-5, -3(12)+4)$

$\to \boxed{(-23, -32)}$

b) $y = 2f(6x)$

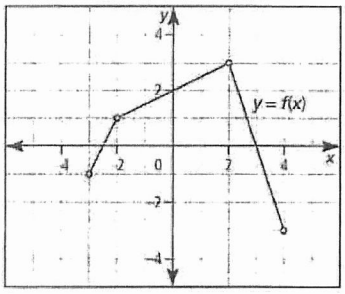
$(x,y) \to (\frac{1}{6}x, 2y)$

$(-18,12) \to (\frac{1}{6}(-18), 2(12))$

$\to \boxed{(-3, 24)}$

11. Consider the graph of the function $y = f(x)$.

Sketch $y = f(x)$ to $y = 3f(-2(x-1)) + 4$.



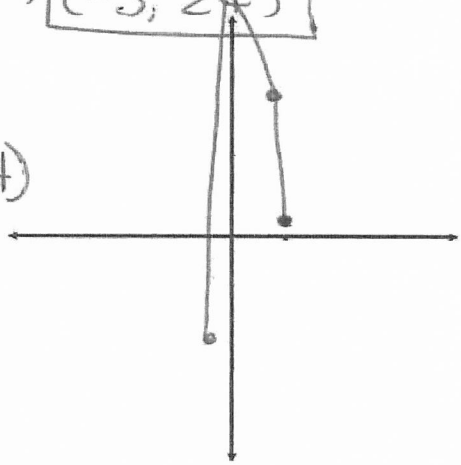
$(x,y) \to (-\frac{1}{2}x+1, 3y+4)$

$(-3,-1) \to (\frac{5}{2}, 1)$

$(-2,1) \to (2,7)$

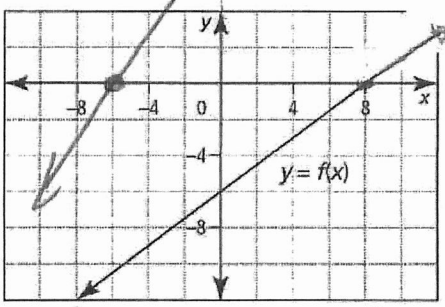
$(2,3) \to (0,13)$

$(4,-3) \to (-1,-5)$



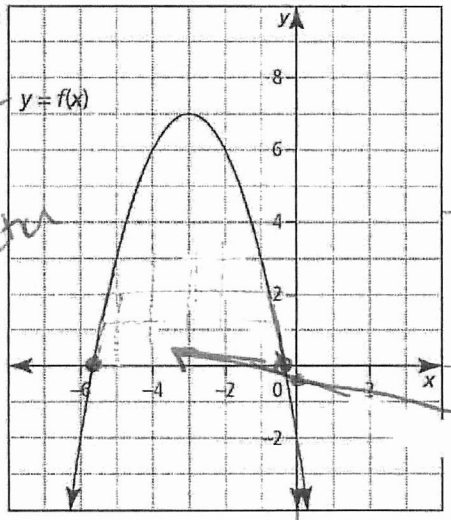
Level 4

12. Sketch the graph of its inverse, $x = f(y)$. Determine whether the inverse is a function. If the inverse is not a function, restrict the domain of the original graph to make it a function.



Inverse is a function

b)

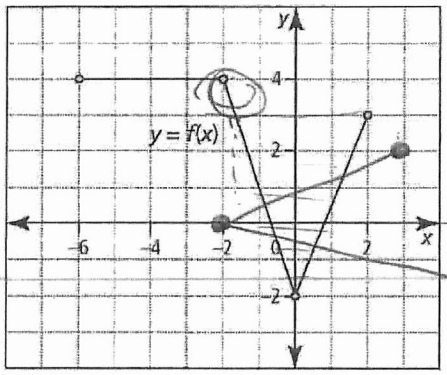


Inverse not a function

$\sqrt{7} = 2.64..$

$\sqrt{4} = 2$

c)



$(x,y) \to (y,x)$

Inverse Not a function

Restrict domain to $[-2,0]$ or $[0,2]$

Restrict domain to $(-\infty,-3]$ or $[-3,\infty)$

Outcome 2A

1. Identify a, b, h and k for each of the following

a) $y = 5\sqrt{x+7} - 2$

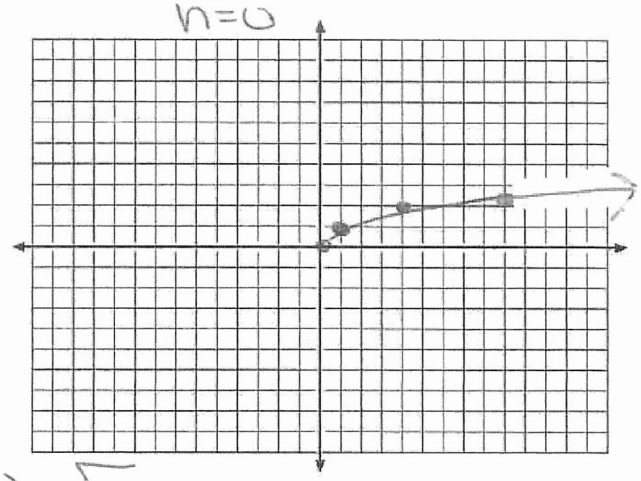
a = 5
b = 1
h = −7
k = −2

b) $y = -4\sqrt{-x} + 8$

a = −4
b = −1
h = 0
k = 8

2. Graph $y = \sqrt{x}$

x	y
0	0
1	1
4	2
9	3



Level 3

3. Write the equation of a radical function that would result by applying each set of transformations to the graph of $f(x) = \sqrt{x}$

a) vertical stretch by a factor of 3, and horizontal stretch by a factor of 2

$y = 3\sqrt{\frac{1}{2}x}$ or $y = 3f(\frac{1}{2}x)$

b) horizontal reflection in the *y*-axis, translation up 3 units, and translation left 2 units

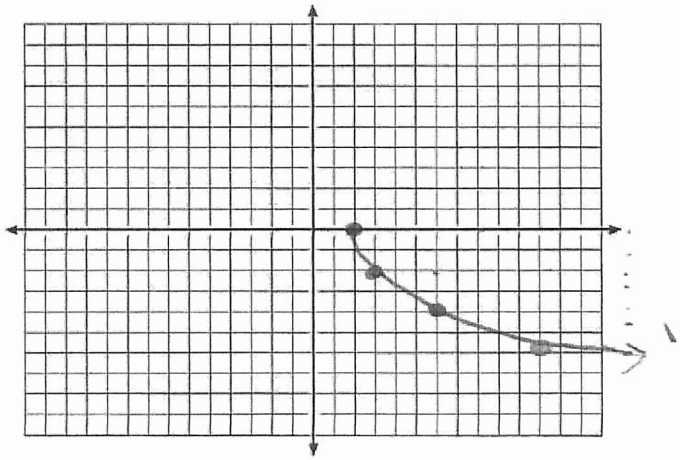
$y = \sqrt{-(x+2)} + 3$ or $y = f(-(x+2)) + 3$

4. Graph the functions below.

Then, identify the domain and range.

a) $y = -2\sqrt{x-2}$

$(x, y) \rightarrow (x+2, -2y)$
$(0,0) \rightarrow (2, 0)$
$(1,1) \rightarrow (3, -2)$
$(4,2) \rightarrow (6, -4)$
$(9,3) \rightarrow (11, -6)$



D = [2, ∞)
R = (−∞, 0]

c) $y = \sqrt{2x} - 4$

$(x, y) \to (\frac{1}{2}x, y-4)$

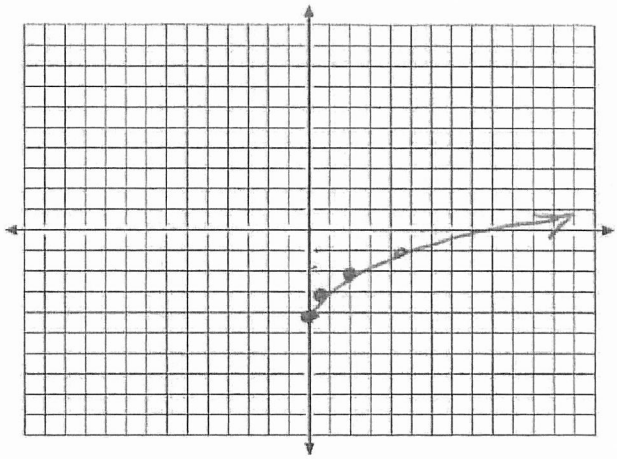
$(0,0) \to (0, -4)$

$(1,1) \to (\frac{1}{2}, -3)$

$(4,2) \to (2, -2)$

$(9,3) \to (4.5, -1)$

$D = [0, \infty)$ $R = [-4, \infty)$



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

$(x, y) \to (-x+3, 2y+1)$

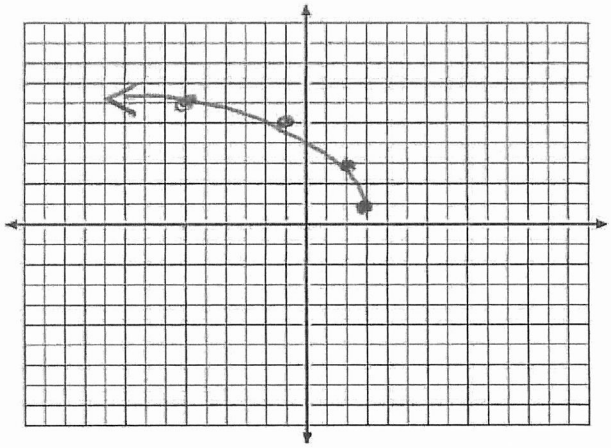
$(0,0) \to (3, 1)$

$(1,1) \to (2, 3)$

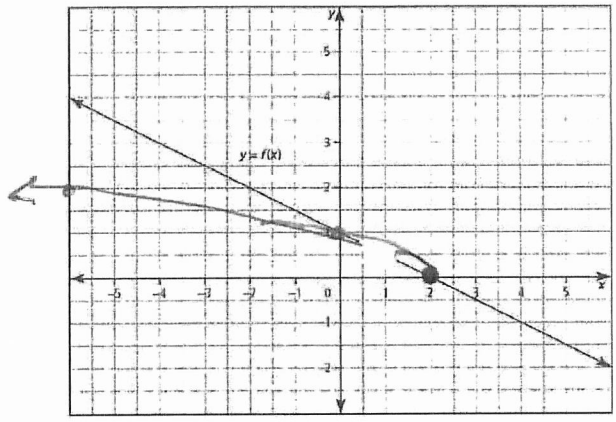
$(4,2) \to (-1, 5)$

$(9,3) \to (-6, 7)$

$D = (-\infty, 3]$ $R = [1, \infty)$

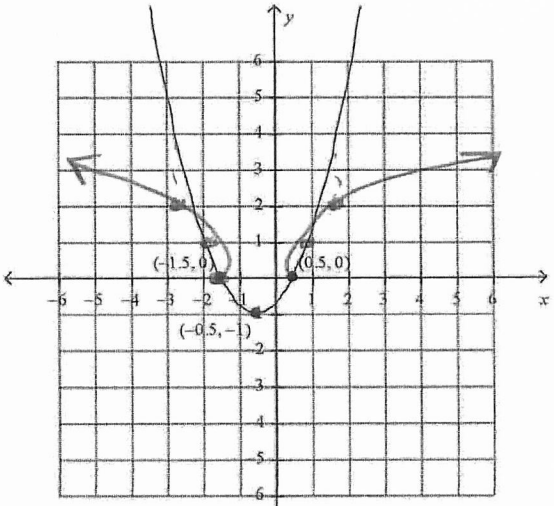


5. Graph $\sqrt{f(x)}$ from the following graphs of *f(x)* and state the **domain and range**



$D = (-\infty, 2]$

$R = [0, \infty)$

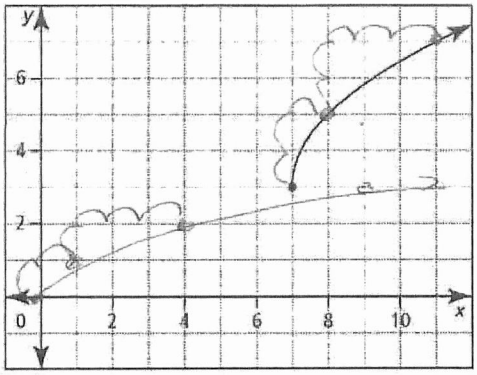


$D = (-\infty, -1.5] \cup [0.5, \infty)$

$R = [0, \infty)$

6. For each function, write an equation of a radical function of the form $y = a\sqrt{b(x-h)} + k$.

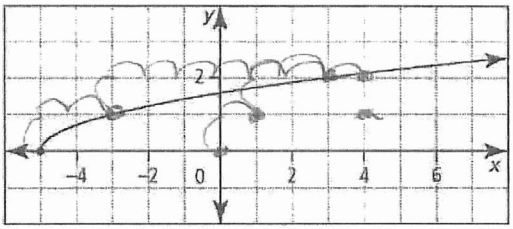
a)



$y = 2f(x-7) + 3$

$y = 2\sqrt{x-7} + 3$

b)



H. stretch x 2

$y = f(\frac{1}{2}(x+5))$

$y = \sqrt{\frac{1}{2}(x+5)}$

Outcome 3A Review

1. Divide the following using long division or synthetic division.

a) $(2w^4 + 3w^3 - 5w^2 + 2w - 27) \div (w+3)$

3	2	3	-5	2	-27
	↓	6	-9	12	-30
	2	-3	4	-10	3

$2w^3 - 3w^2 + 4w - 10 + \left(\frac{3}{w+3}\right)$

b) $\frac{2x^3 - 10x^2 - 15x - 20}{x+5}$

5	2	-10	-15	-20
	↓	10	-100	425
	2	-20	85	-445

$2x^2 - 20x + 85 + \left(\frac{-445}{x+5}\right)$

2. Determine the remainder when $x^3 + x^2 - 16x - 16$ is divided by

a. $x + 2$

$P(-2) = 12$

b) $x - 4$

$P(4) = 0$

b) Are any of the binomials above a factor of $x^3 + x^2 - 16x - 16$?

$x - 4$

3. Factor completely

a. $x^3 + 2x^2 - 13x + 10$

$P(1) = 1 + 2 - 13 + 10$
$= 0$

$x - 1$ a factor

$$\begin{array}{r|rrrr} -1 & 1 & 2 & -13 & 10 \\ & \downarrow & -1 & -3 & 10 \\ \hline & 1 & 3 & -10 & 0 \end{array}$$

$(x-1)(x^2 + 3x - 10)$

$\boxed{(x-1)(x+5)(x-2)}$

b. $x^4 - 26x^2 + 25$

$P(1) = 0$ $x - 1$ a factor

$$\begin{array}{r|rrrrr} -1 & 1 & 0 & -26 & 0 & 25 \\ & \downarrow & -1 & -1 & 25 & 25 \\ \hline & 1 & 1 & -25 & -25 & 0 \end{array}$$

$(x-1)\underbrace{(x^3 + x^2 - 25x - 25)}_{\text{another division}}$

$(x-1)(x+1)(x+5)(x-5)$

4. Determine the value(s) of k so that the binomial is a factor of the polynomial: $x^2 - 8x - 20$, $x + k$

$P(-k) = 0$

$(-k)^2 - 8(-k) - 20 = 0$

$k^2 + 8k - 20 = 0$

$(k+10)(k-2) = 0$

$\boxed{k = -10 \quad k = 2}$

5. The following polynomial has a factor of $x - 3$. What is the value of k? $kx^3 - 10x^2 + 2x + 3$

$P(3) = 0$

$k(3)^3 - 10(3)^2 + 2(3) + 3 = 0$

$27k - 90 + 6 + 3 = 0$

$27k - 81 = 0$

$\frac{27k = 81}{27}$

$k = 3$

Outcome 3B Review

1. Determine which of the following are polynomials. For each polynomial function, state the degree.

a) $h(x) = 5 - \frac{1}{x}$

No

b) $y = 4x^2 - 3x + 8$

Yes

$d = 2$

c) $g(x) = -9x^6$

yes

$d = 6$

d) $f(x) = \sqrt[3]{x}$

No

2. What is the leading coefficient, degree and constant term of each polynomial function?

a) $f(x) = -x^3 + 6x - 8$

LC = -1

deg = 3

con = -8

b) $y = 5 + 2x^2$

LC = 2

Deg = 2

Con = 5

c) $g(x) = 7x^3 + 3x^5 - 8x + 10$

LC = 3

deg = 5

con = 10

d) $k(x) = 9x - 2x^2$

LC = -2

deg = 2

con = 0

3. Identify the following characteristics for each polynomial function:

- the type of function and whether it is of even or odd degree
- the end behaviour of the graph of the function
- the number of possible x-intercepts
- the y-intercept

a) $g(x) = -2x^4 + 6x^2 - 7x - 5$

Even 0-4 x int

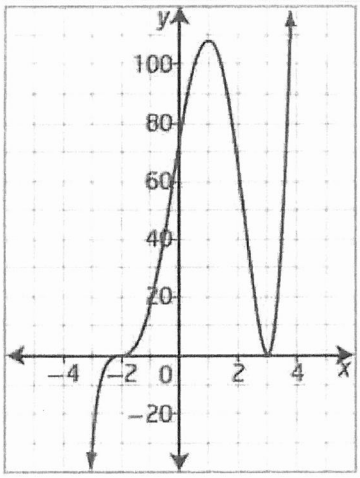
III → IV y int = -5

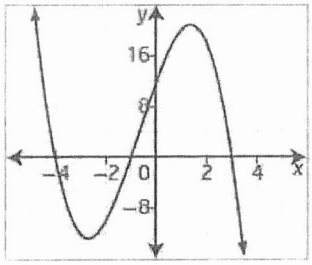
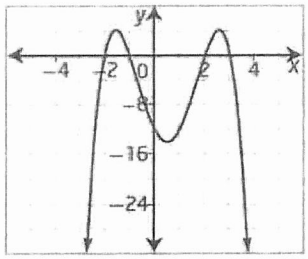
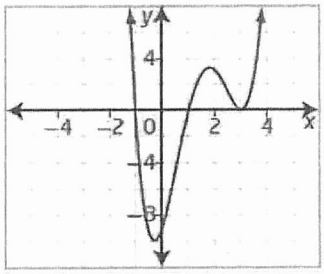
b) $f(x) = 2x^5 + 1x^3 - 12$

odd 1-5 x int

III → I y int = -12

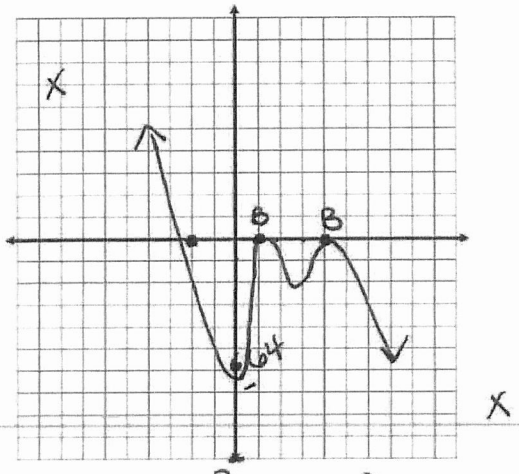
4. Fill in the table below for the following graphs

Graph	Odd or Even	Sign of Leading Coefficient	Number of x-intercepts	Intervals where the function is positive	Intervals where the function is negative
	ODD	+	2	(-2, 3) ∪ (3, ∞)	(-∞, 2)

	Odd or Even	Sign of Leading Coefficient	Number of x-intercepts	Intervals where the function is positive	Intervals where the function is negative
	O	−	3	$(-\infty,-4)$ ∪ $(-1,3)$	$(-4,-1)$ ∪ $(3,\infty)$
	E	−	4	$(-2,-1)$ ∪ $(2,3)$	$(-\infty,-2)$ ∪ $(-1,2)$ ∪ $(3,\infty)$
	E	+	3	$(-\infty,-1)$ ∪ $(1,3)$ ∪ $(3,\infty)$	$(-1,1)$

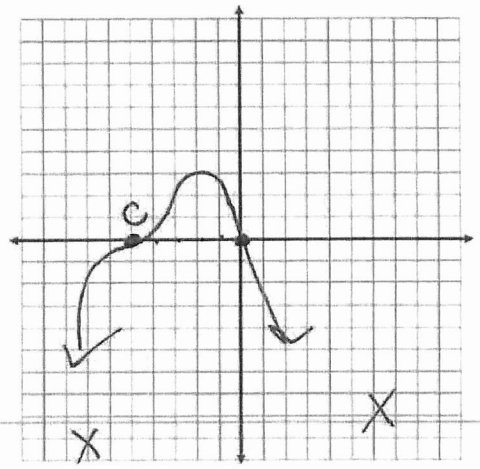
4. Graph the following polynomial functions. The first three have already been factored for you.

$y = -2(x-1)^2(x+2)(x-4)^2$ d=5 LC



$f(0) = -2(-1)^2(2)(-4)^2$

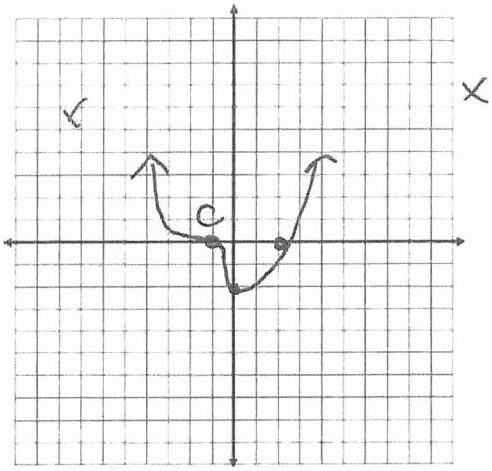
$y = -2x(x+5)^3$ d=4 LC



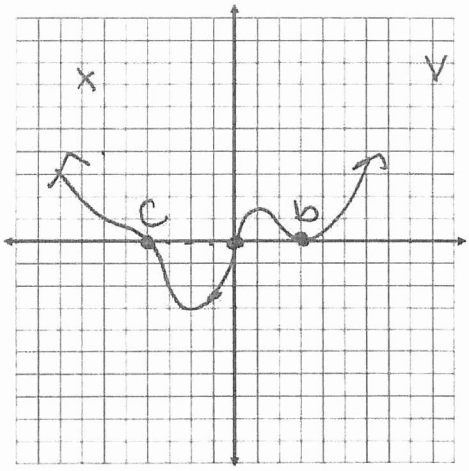
$f(0) = (1)^3(-2) = -2$

c

$y = (x+1)^3(x-2)$ $d=4$ $+LC$



$y = x(x+4)^3(x-3)^2$ $d=6$ $+LC$



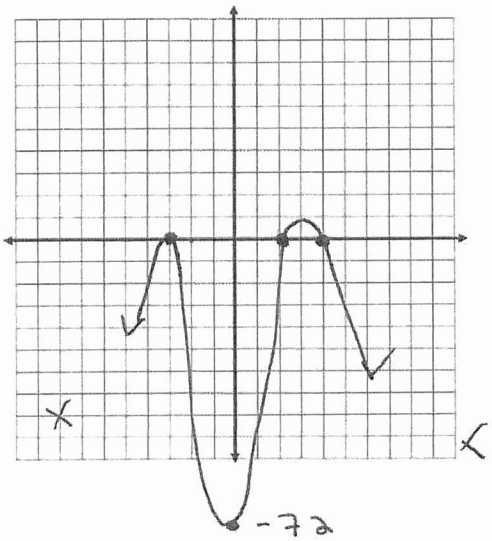
$f(x) = -x^4 + 19x^2 + 6x - 72$

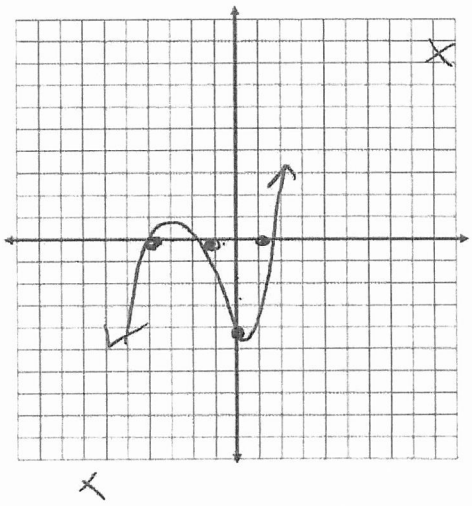
$-(x-2)(x+3)(x-4)(x+3)$

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

$y = x^3 + 4x^2 - x - 4$

$(x-1)(x+4)(x+1)$





Chapter 7 – Outcome30.9c

Level 2

1. Solve

a) $2^x = 64$

$2^x = 2^6$ $\{6\}$

$x = 6$

b) $3^x = 27^{x-2}$

$3^x = 3^{3(x-2)}$

$x = 3x - 6$ $x = 3$ $\{3\}$

$-2x = -6$

c) $8^{2x} = 16^{x+3}$

$2^{3(2x)} = 2^{4(x+3)}$

$6x = 4x + 12$ $x = 6$

$2x = 12$ $\{6\}$

d) $9^{2x-5} = 27^{x+6}$

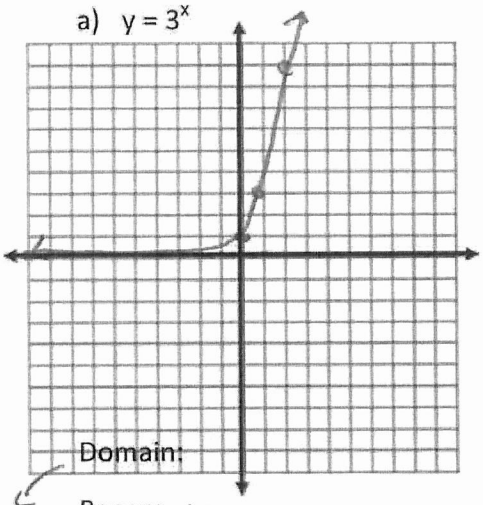
$3^{2(2x-5)} = 3^{3(x+6)}$

$4x - 10 = 3x + 18$

$x = 28$ $\{28\}$

2. Graph each of the following, and then determine the:

a) $y = 3^x$



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

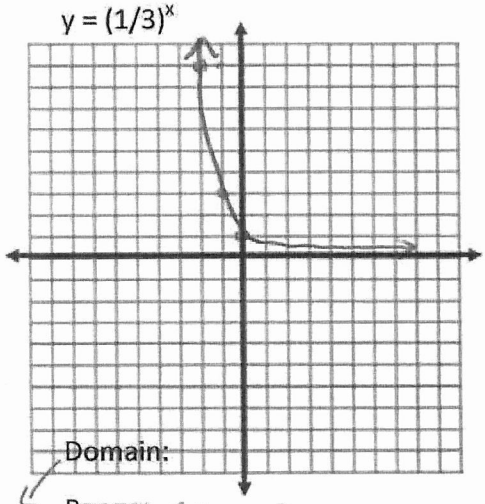
Range: $(0, \infty)$

Horizontal asymptote $y = 0$

Y intercept: $(0, 1)$

Increasing or Decreasing:

$y = (1/3)^x$



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

Range: $(0, \infty)$

Horizontal asymptote $y = 0$

Y intercept: $(0, 1)$

Increasing or Decreasing:

2. . Identify all of the transformations of the following: (ie vertical translation up 2)

Base $y = 3^x$

a) $f(x) = 3^{-x} + 5$

$b = -1$ h-reflection about y-axis

$K = 5$ v. trans up 5

Base $y = \left(\frac{1}{3}\right)^x$

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

$a = -2$ v. stretch x2

v. reflection about x-axis

$h = -1$ move 1 unit left

Level 3

4. Sketch the graph of

$y = -3^{x-2}$

Base $y = 3^x$

$(x, y) \rightarrow (x+2, -y)$

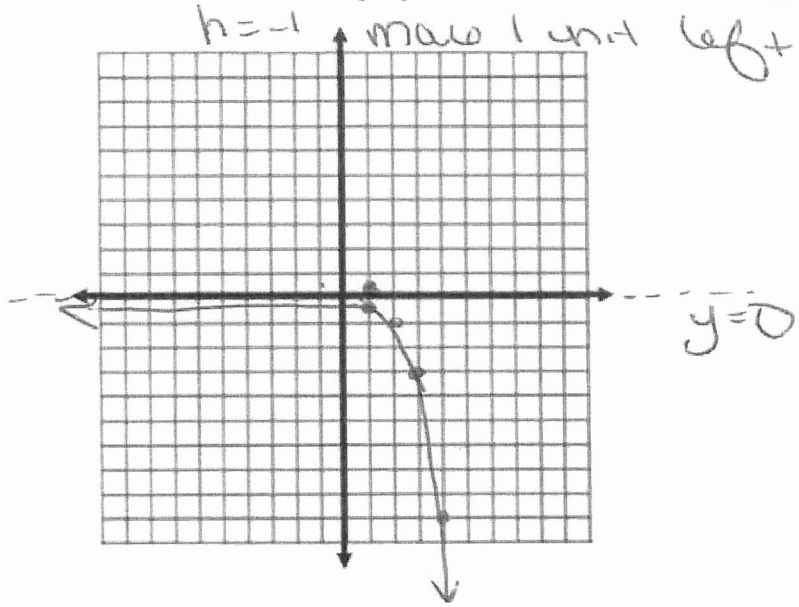
$(-1, \frac{1}{3}) \quad (1, -\frac{1}{3})$

$(0, 1) \quad (2, -1)$

$(1, 3) \quad (3, -3)$

$(2, 9) \quad (4, -9)$

$(3, 27) \quad (5, -27)$



$y = 3(2^{-x}) - 5$

Base $y = 2^x$

$(x, y) \rightarrow (-x, 3y-5)$

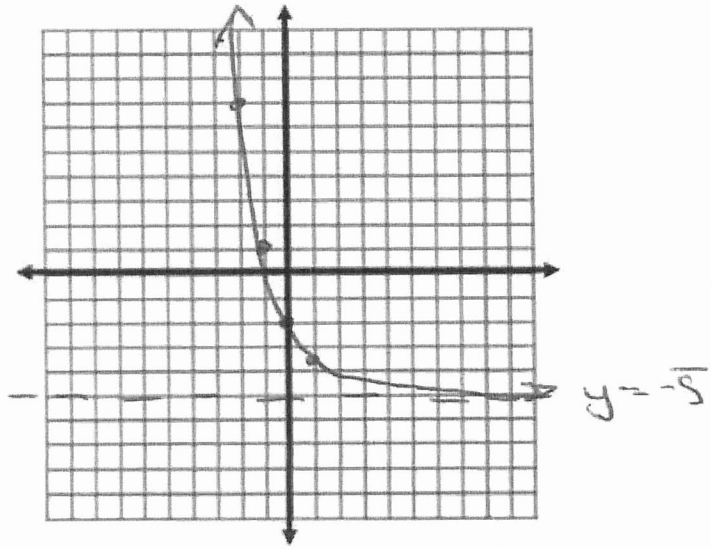
$(-1, \frac{1}{2}) \rightarrow (1, -3.5)$

$(0, 1) \rightarrow (0, -2)$

$(1, 2) \rightarrow (-1, 1)$

$(2, 4) \rightarrow (-2, 7)$

$(3, 8) \rightarrow (-3, 19)$



$y = 2^{2x+4} - 1$

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

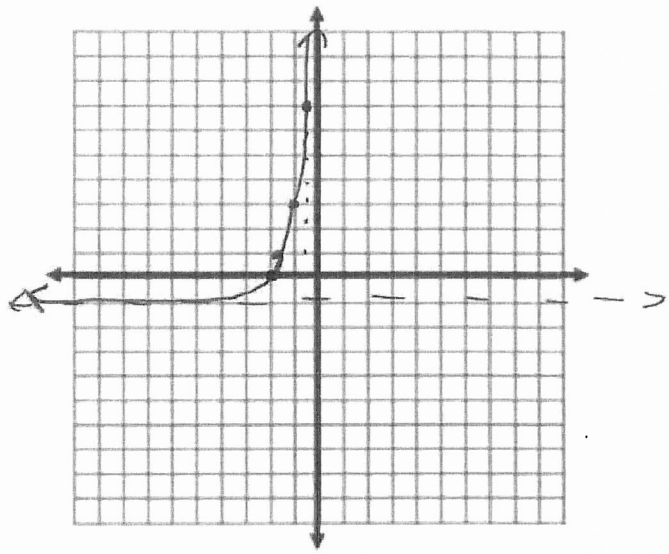
$(x, y) \to (\frac{1}{2}x - 2, y - 1)$

$(0, 1) \to (-2, 0)$

$(1, 2) \to (-1.5, 1)$

$(2, 4) \to (-1, 3)$

$(3, 8) \to (-0.5, 7)$



Chapter 8 – Part 1

Level 2

1. Express as a logarithmic statement.

$$2^3 = 8$$

$\log_2 8 = 3$

2. Express as an exponential statement.

$$\log_3 81 = 4$$

$3^4 = 8$

3. Determine the value of each logarithm.

a) $\log_5 25$

2

b) $\log_2 \frac{1}{8}$

-3

c) $\log_9 1$

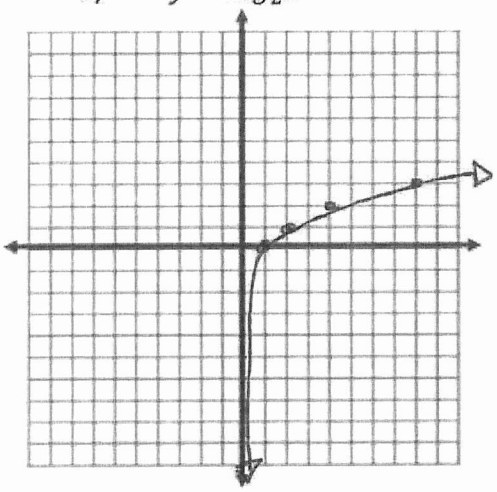
0

d) $\log_6 6$

1

4. Graph each of the following and determine

b) $y = log_2 x$



Domain: $(0, \infty)$

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

Vertical asymptote $x = 0$

x intercept: $(1, 0)$

y intercept: NA

5. Identify all of the transformations of the following: (state all stretches/reflections/translations up, down left or right)

a) $y = -2log_3(x-5) + 2$

$a = -2$ v. stretch x2

$b = 1$ v. ref. about x axis

$h = 5$ right 5

$k = 2$ up 2

$y = 2\log_3(-x) + 1$

$a = 2$ v. stretch x2

$b = -1$ h. reflect. about y

$h = 0$

$k = 1$ up 1

Level 3

6. Sketch

$y = -\log_2(x+1) - 2$

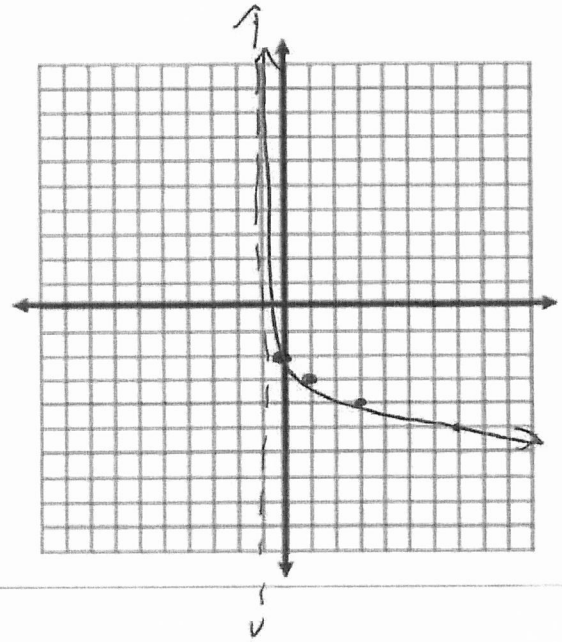
$(x, y) \rightarrow (x-1, -y-2)$

$(1, 0) \rightarrow (0, -2)$

$(2, 1) \rightarrow (1, -3)$

$(4, 2) \rightarrow (3, -4)$

$(8, 3) \rightarrow (7, -5)$



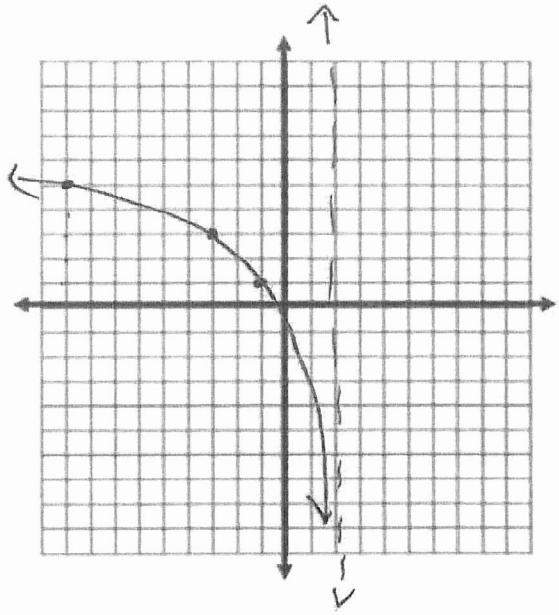
$y = 2\log_3(x-2) + 1$

$(x, y) \rightarrow (-x, 2y+1)$

$(1, 0) \rightarrow (-1, 1)$

$(3, 1) \rightarrow (-3, 3)$

$(9, 2) \rightarrow (-9, 5)$



Chapter 8 Part 2

Level 2

1. Use your laws of logarithms to expand each of the following:

   a) $\log_4 \frac{x}{3}$ b) $\log_4 x^5$ c) $\log_2 yx^5$

   $\log_4 x - \log_4 3$ $5\log_4 x$ $\log_2 y + 5\log_2 x$

2. Use the laws of logarithms to simplify each of the following:

   a) $\log 2 + \log 7$ b) $4\log_3 5$ c) $\log_2 42 - \log_2 6$

   $\log 14$ $\log_3 625$ $\log_2 7$

3. Determine the value of x.

   a) $\log_2 x = 3$

   $2^3 = x$

   $8 = x$

   b) $3\log_5 x = \log_5 125$

   $\log_5 x^3 = \log_5 5^3$

   $x = 5$

   c) $6^x = 216$

   $6^x = 6^3$

   $x = 3$

   d) $4^{x+1} = 64$

   $4^{x+1} = 4^3$

   $x = 2$

Level 3

4. Use the laws of logarithms to simplify and then evaluate each of the following:

a) $\log_3 270 - (\log_3 2 + \log_3 5)$

$\log_3 \frac{270}{2 \cdot 5}$

$\log_3 \frac{270}{10}$

$\log_3 27$

3

b) $3\log_2 6 - 3\log_2 3$

$\log_2 \frac{\cancel{216}}{27}$

$\log_2 8$

3

5. Write each expression in terms of individual logarithms.

a) $\log_2 \frac{x^5 \sqrt[3]{y}}{7z}$

$5\log_2 x + \frac{1}{3}\log_2 y - \log_2 7 - \log_2 z$

b) $\log_5 \sqrt{xy^3}$

$\frac{1}{2}\log_5 x + \frac{3}{2}\log_5 y$

6. Write each expression as a single logarithm.

a) $3\log w + \log\sqrt{w} - 2\log w$

$\log w^3 + \log w^{1/2} - \log w^2$

$\log \frac{w^3 \cdot w^{1/2}}{w^2}$

$\log w^{3/2}$

$\frac{3}{2}\log w$

$3 + \frac{1}{2} - 2$

$1\frac{1}{2}$

$\frac{3}{2}$

b) $\log_2(x+6) + \log_2(x-1)$

$\log_2 (x+6)(x-1)$

$\log_2 (x^2 + 5x - 6)$

7. Solve for x.

a) $\log_5 x + 6 = 8$

$\log_5 x = 2$

$5^2 = x$

$\boxed{25 = x}$

b) $\log_4 x + \cancel{2}\log_4 x^2 = 6$

$\log_4 x^3 = 6$

$\sqrt[3]{4^6} = \sqrt[3]{x^3}$

$4^2 = x$

$\boxed{16 = x.}$

c) $\log_2 x^2 - \log_2 5 = \log_2 20$

$\log_2 \frac{x^2}{5} = \log_2 20$

$\frac{x^2}{5} = 20$

$\sqrt{x^2} = \pm\sqrt{100}$

$x = \pm 10$

* -10 works b/c $\log_2(-10)^2 = \log_2 100$ ✓

d) $log_3(x+7) - log_3(x-3) = 2$

$\log_3 \frac{(x+7)}{(x-3)} = 2$

$3^2 = \frac{x+7}{x-3}$

$9 = \frac{x+7}{x-3}$

$9x - 27 = x + 7$

$8x = 34$

$x = \frac{34}{8} = \frac{17}{4} = 4.25$

e) $3^x = 100$

$\log 3^x = \log 100$

$x \log 3 = \log 100$

$x = \frac{\log 100}{\log 3}$

$x \approx 4.1918$

f) $7^{x-3} = 517$

$\log 7^{x-3} = \log 517$

$\frac{(x-3)\log 7 = \log 517}{\log 7}$

$x - 3 = \frac{\log 517}{\log 7} + 3$

$+3$

$x = \frac{\log 517}{\log 7} + 3$

$x \approx 6.21086$

Level 4

8. Solve the following. State any restrictions

$$log_6(x+3) - 2 = -log_6(x-2)$$

$\log_6(x+3) + \log_6(x-2) = 2$

$\log_6 (x+3)(x-2) = 2$

$x + 3 > 0$

$\cancel{x > -3}$

$x - 2 > 0$

$x > 2$

$6^2 = (x+3)(x-2)$

$36 = x^2 + 3x - 2x - 6$

$-36 \qquad -36$

$0 = x^2 + x - 42$

$0 = (x+7)(x-6)$

$\cancel{x = -7}$ $\boxed{x = 6}$

9. Use what you have learned about logarithms to show how you could use two different transformations to graph the logarithmic function $y = log_2 8x$

① $y = \log_2 8x \rightarrow$ h. stretch of $\frac{1}{8}$

2. $y = \log_2 8 + \log_2 x$

$y = 3 + \log_2 x$ v. trans up 3

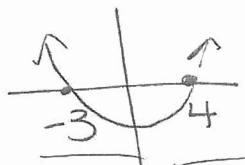
10. Simplify the following logarithm. State the restrictions

log $(x^2 - x - 12) - log\ (x^2 - 9)$

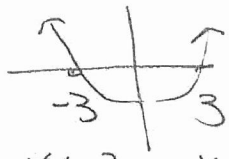
$\log\left(\frac{x^2-x-12}{x^2-9}\right)$

$\log\frac{(x-4)\cancel{(x+3)}}{\cancel{(x+3)}(x-3)}$

$\log\left(\frac{x-4}{x-3}\right)$, $x<-3$, $x>4$



$\boxed{x<-3}$ $\boxed{x>4}$



$x<-3$ $x>3$

Chapter 9 Review

Level 2

1. Determine the characteristics of the following functions:

a) $y = \frac{2x-1}{x-4}$

Equation of Vertical Asymptotes: $x = 4$

Points of Discontinuity (holes): NA

Equation of Horizontal Asymptote: $y = 2$

b) $y = \frac{\cancel{x+5}}{\cancel{(x+5)}(x-3)} = \frac{1}{x-3}$

Equation of Vertical Asymptotes: $x = 3$

Points of Discontinuity (holes): $(-5, -1/8)$

Equation of Horizontal Asymptote: $y = 0$

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

Equation of Vertical Asymptotes: $x = -1$

Points of Discontinuity (holes): $(-2, 4)$

Equation of Horizontal Asymptote: $y = 1$

Level 3/Level 4 (Level 4 Questions will have an oblique asymptote. You will need to determine that on your own.)

2. Graph the following functions. Be sure to give the equations of all asymptotes.

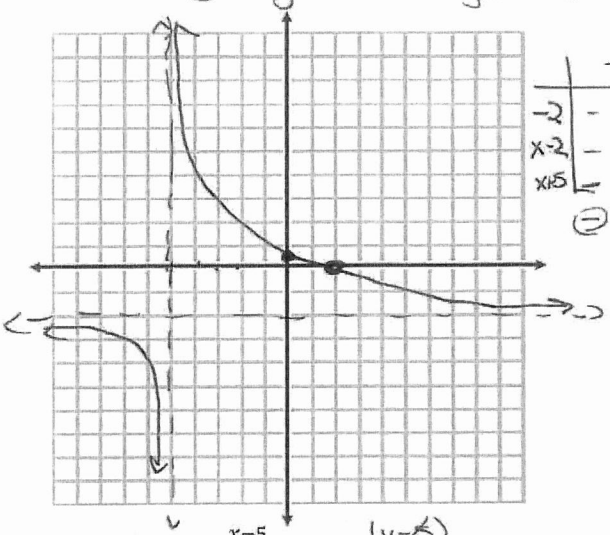
a) $y = \frac{-2x+4}{x+5} = \frac{-2(x-2)}{x+5}$

V.A @ $x=-5$

HA @ $y=-2$

x int $(2,0)$

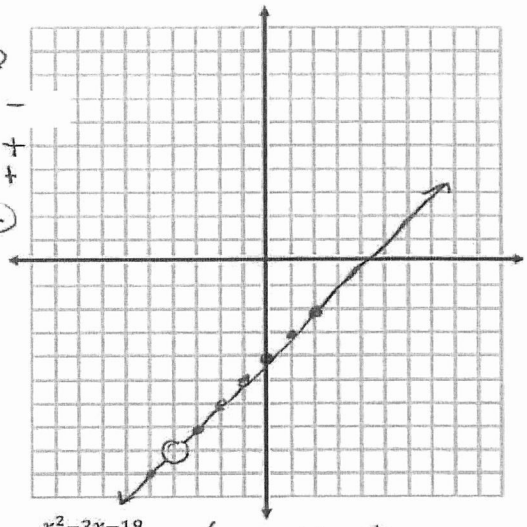
y int $(0,4/5)$



		-5		2	
-2	−		−		−
x-2	−		−		+
x+5	−		+		+
	−		+		−

b) $y = \frac{x^2-16}{x+4} = \frac{(x-4)\cancel{(x+4)}}{\cancel{(x+4)}} = x-4$

hole $(-4,-8)$



c) $y = \frac{x-5}{x^2-2x-15} = \frac{\cancel{(x-5)}}{\cancel{(x-5)}(x+3)}$

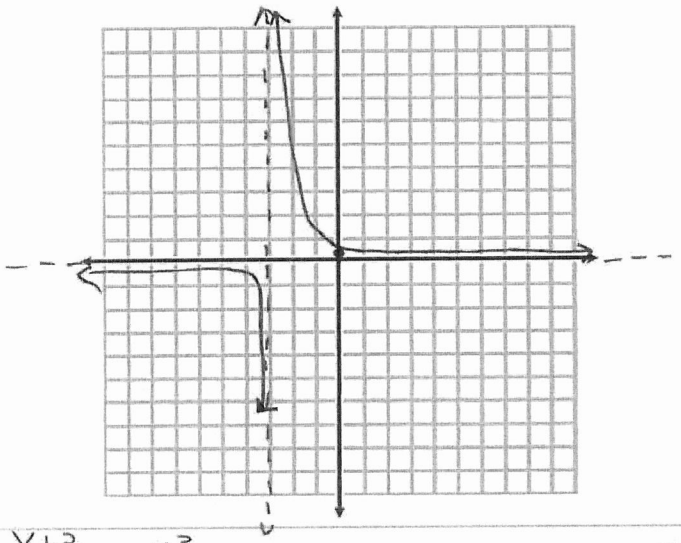
$= \frac{1}{x+3}$

VA @ $x=-3$

HA @ $y=0$

y int $(0, 1/3)$

no x int



		-3	
x+3	−		+
	−		+

d) $y = \frac{x^2-3x-18}{x^2+7x+12} = \frac{(x-6)\cancel{(x+3)}}{\cancel{(x+3)}(x+4)}$

$= \frac{x-6}{x+4}$

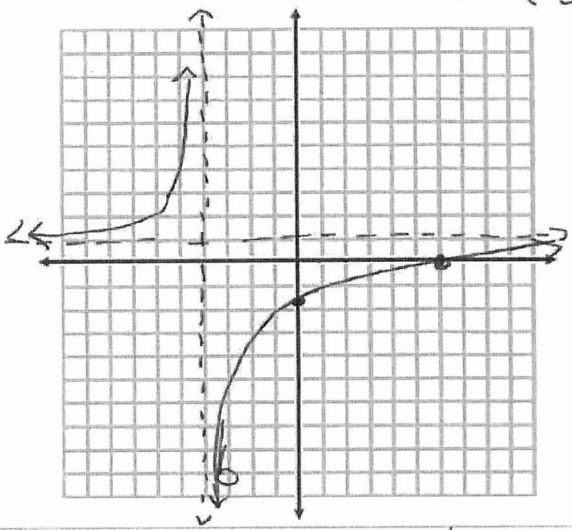
V.A @ $x=-4$

H.A @ $y=1$

x int $(6,0)$

y int $(0,-1.5)$

Hole $(-3,-9)$



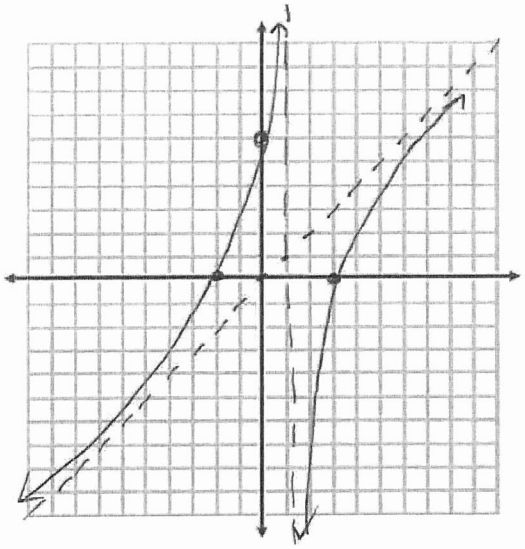
		-4		6	
x-6	−		−		+
x+4	−		+		+
	+		−		+

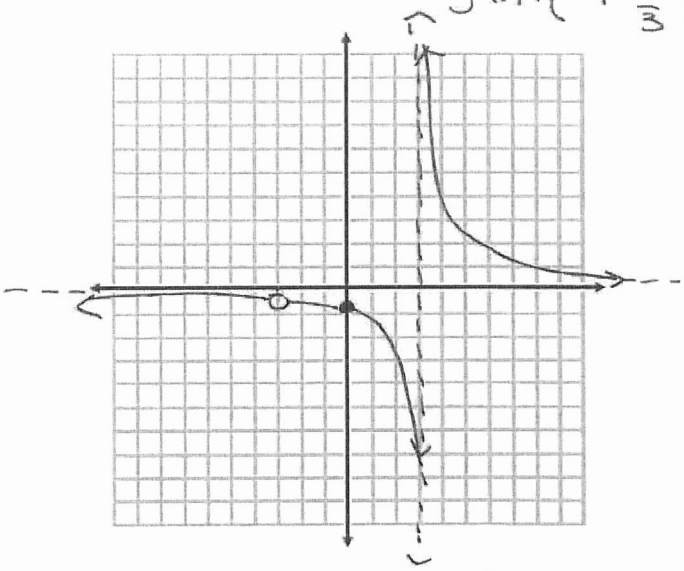
$y = \frac{x^2-x-6}{x-1} = \frac{(x-3)(x+2)}{(x-1)}$

$y = \frac{2x+6}{x^2-9} = \frac{2\cancel{(x+3)}}{\cancel{(x+3)}(x-3)} = \frac{2}{x-3}$

Hole $(-3, -\frac{1}{3})$

y int $(0, -\frac{2}{3})$





O.A.

xint $(-2,0)$
$(3,0)$

yint $(0,6)$

$\#-1$

	1	-1	-6
↓		-1	0
1x		0	-6

		-3	
2	+		+
x-3	−		+
	−		+

OA@ y=x

		-2		1		3	
x-3	−		−		−		+
x+2	−		+		+		+
x-1	−		−		+		+
	−		+		−		+