Mastery Checklist
Key Features of Functions

In order to prove Mastery for this concept you must be able complete the following all by **yourself.** No help from Notes, Partners or Teacher. Use all other problems to practice and test yourself with the following:

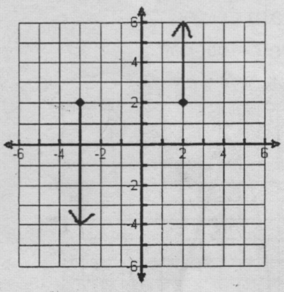
- ☐ Complete the graphic organizer in under 3 mins with out notes
- ☐ Complete 2 from Level ** on "2C worksheet"
- ☐ Complete #10 &11 on "Domain and Range Worksheet #1"
- ☐ Complete #9,12,&15 on " LT: 5A Exponential Functions"
- ☐ Complete 2 Level *** on "Graphing Parent Functions using Transformations"

LT: 2C

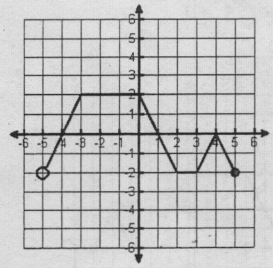
Domain and Range Worksheet #1 Name: ____________________

State the domain and range for each graph and then tell if the graph is a function (write yes or no). If the graph is a function, state whether it is discrete, continuous or neither.

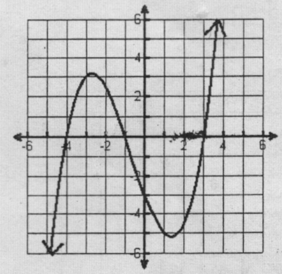
1) Domain____________________
Range____________________
Function?____________________



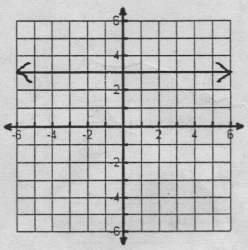
2) Domain____________________
Range____________________
Function?____________________



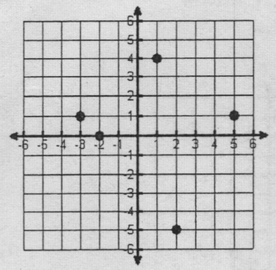
3) Domain____________________
Range____________________
Function?____________________



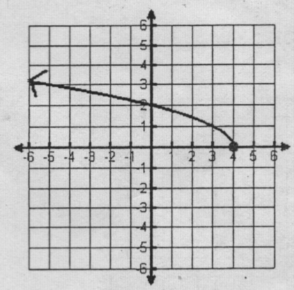
4) Domain____________________
Range____________________
Function?____________________



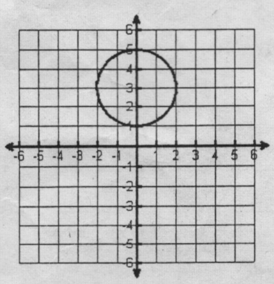
5) Domain____________________
Range____________________
Function?____________________



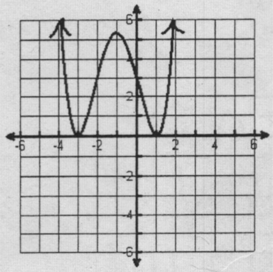
6) Domain____________________
Range____________________
Function?____________________



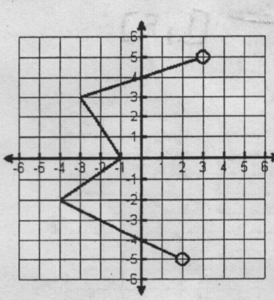
7) Domain____________________
Range____________________
Function?____________________



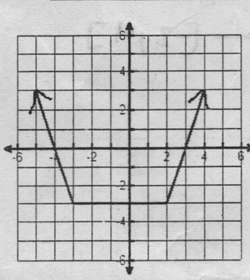
8) Domain____________________
Range____________________
Function?____________________



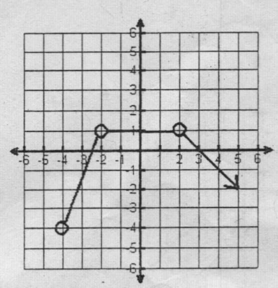
9) Domain____________________
Range____________________
Function?____________________



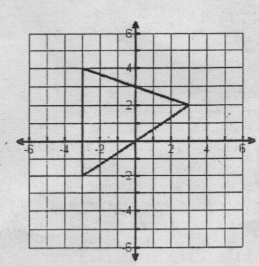
10) Domain____________________
Range____________________
Function?____________________



11) Domain____________________
Range____________________
Function?____________________



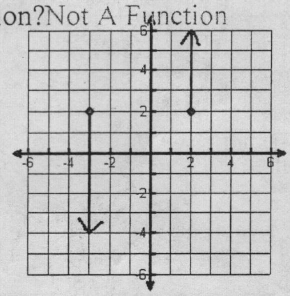
12) Domain____________________
Range____________________
Function?____________________



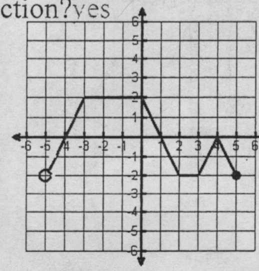
Answer Key Domain and Range Worksheet #1 **Name:** ____________________

State the domain and range for each graph and then tell if the graph is a function (write yes or no). If the graph is a function, state whether it is discrete, continuous or neither.

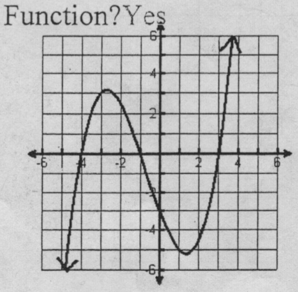
1) Domain: -3 and 2
Range $(-\infty, \infty)$
Function? Not A Function



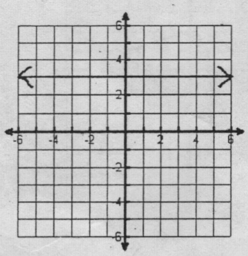
2) Domain: (-5, 5]
Range [-2, 2]
Function? yes



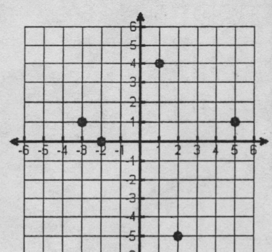
3) Domain $(-\infty, \infty)$
Range $(-\infty, \infty)$
Function? Yes



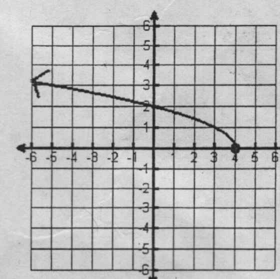
4) Domain $(-\infty, \infty)$
Range 3
Function? yes



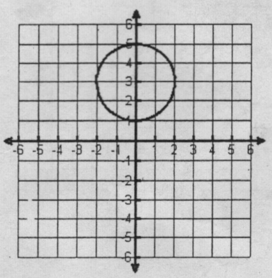
5) Domain -3, -2, 2, 4 and 5
Range -5, 0, 1 and 4
Function? Yes



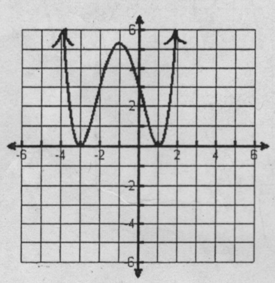
6) Domain $(-\infty, 4]$
Range $[0, \infty)$
Function? yes



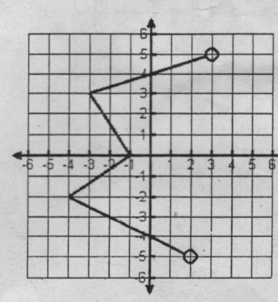
7) Domain [-2,2]
Range ~~[-2,2]~~ [1, 5]
Function? No



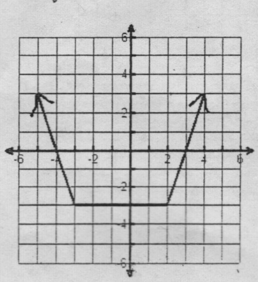
8) Domain $(-\infty, \infty)$
Range $[0, \infty)$
Function? Yes



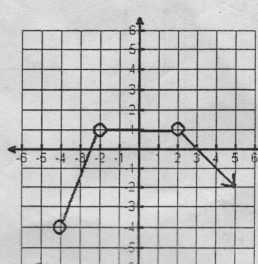
9) Domain [-4,3)
Range (-5, 5)
Function? No



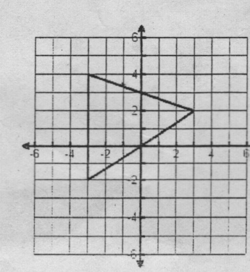
10) Domain $(-\infty, \infty)$
Range $[-3, \infty)$
Function? yes



11) Domain $(-4, \infty)$
Range $(-\infty, 1]$
Function? yes



12) Domain [-3,3]
Range ~~[-3,4]~~ [-2, 4]
Function? No



2A	I can use technology to graph a function (as well as systems) and **analyze the graph** to describe **relevant key features** (End Behavior, Domain, Range, Min/Max, x-& y-intercept, intersection(s))

Level *

Take the graphs out to of the envelope and name all of the graphs.

Level **

List all the key-features of each of the graphs you have named.
(ie. End-behavior, max/min, Domain and Range, x-int and y-int.)

Level***

Take out the graphic organizer and fill in as many boxes as you can.

Tracking My Thinking

Function	Looks Like	End Behavior	Maximum(s) / Minimums(s)	X-Intercepts (roots)	Y-Intercepts	Domain	Range
Linear							
Quadratic							
Cubic							
Square Root							
Cube Root							
Absolute Value							
Exponential							
Logarithmic							
Sine							
Cosine							

LT: 5A Exponential Functions

Evaluate each function at the given value.

1) $f(x) = \frac{1}{3} \cdot 6^x$ at $x = 2$

2) $f(n) = 10 \cdot 2^n$ at $n = 5$

3) $f(n) = 10 \cdot 2^n$ at $n = -2$

4) $g(x) = \frac{1}{5} \cdot \left(\frac{1}{3}\right)^x$ at $x = 3$

Graph the following functions:

5.) $y = 2^{-(x+1)} - 3$

6.) $y = 2^{x-6} + 2$

7.) $y = 2^{-x+3} + 6$

8.) $y = \left(\frac{1}{2}\right)^{x+3} - 2$

9.) $y = \left(\frac{1}{2}\right)^{-(x+4)}$

10.) $y = \left(\frac{1}{2}\right)^{x-6} + 5$

Graph the following functions, If you get stuck try plugging in points:

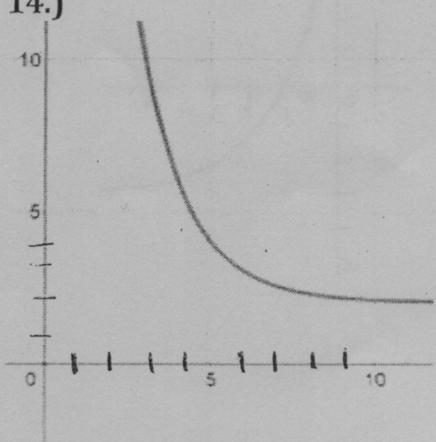
11.) $y = 3^{x-2} + 1$

12.) $y = 3 \cdot 2^{x+1}$

13.) $y = 4 \cdot 2^{-(x-1)} - 3$

Find all possible equations for the following graphs.

14.)



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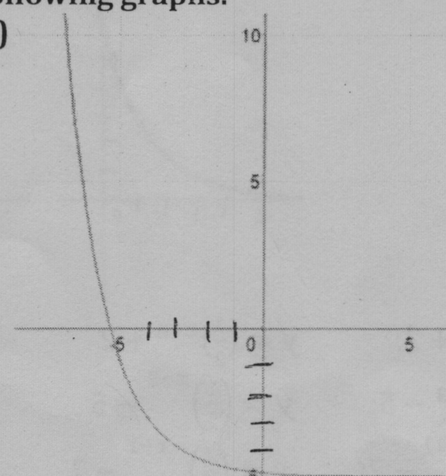

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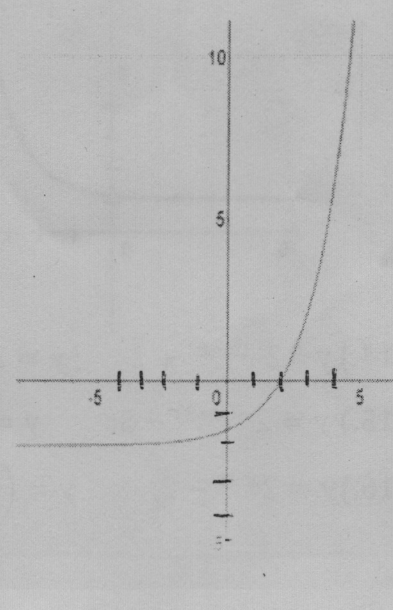


LT: 5A Exponential Functions(Answer Key)

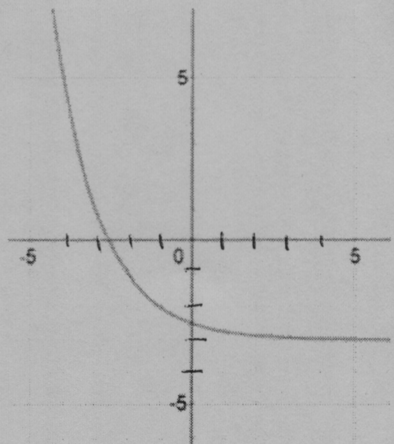
1.) 12

2.) 320

3.) $\frac{5}{2}$

4.) $\frac{1}{135}$

5.)



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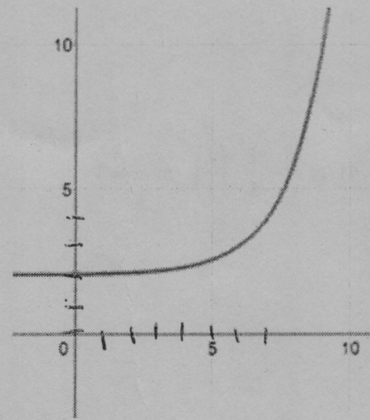

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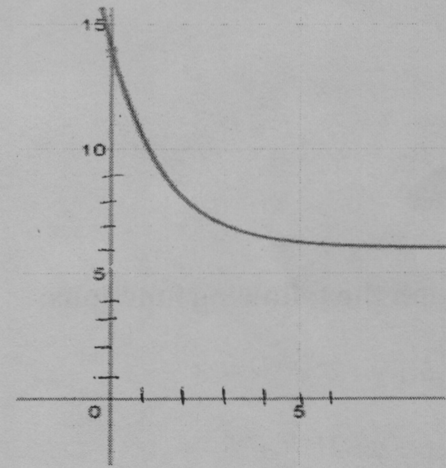

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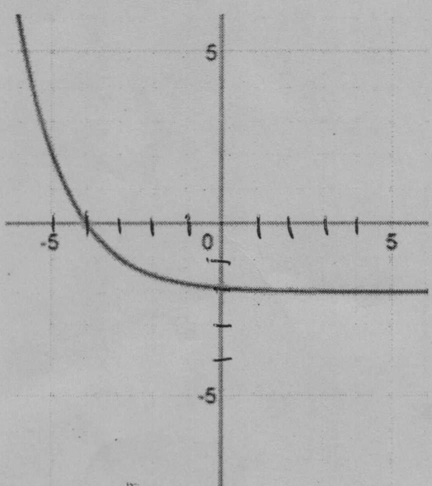

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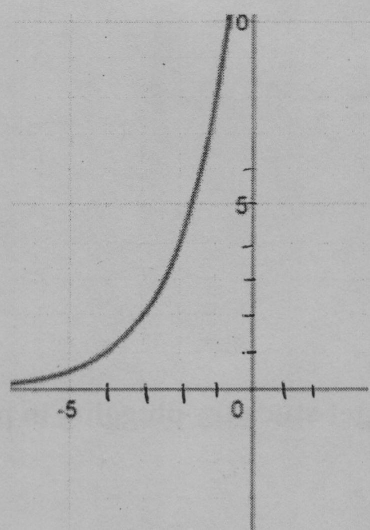

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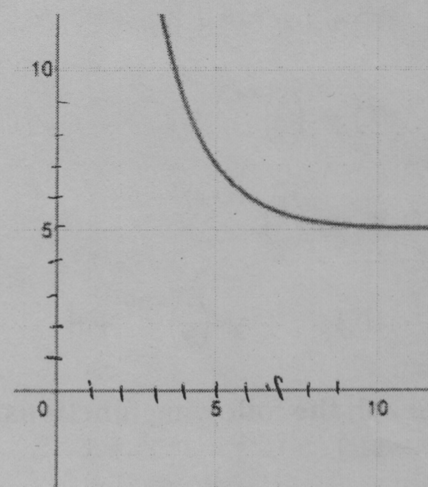

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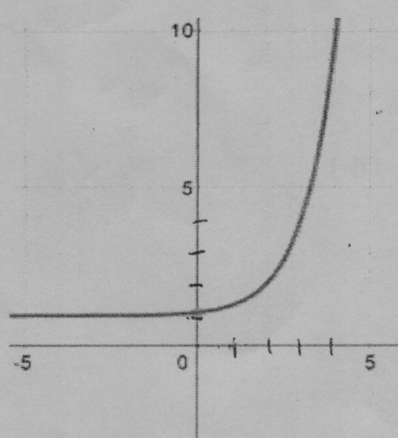

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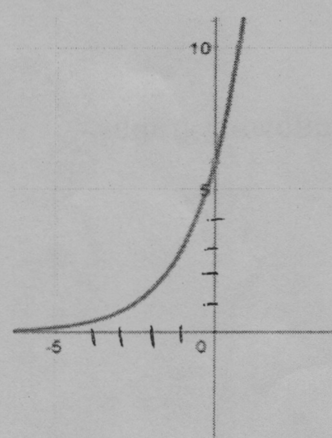

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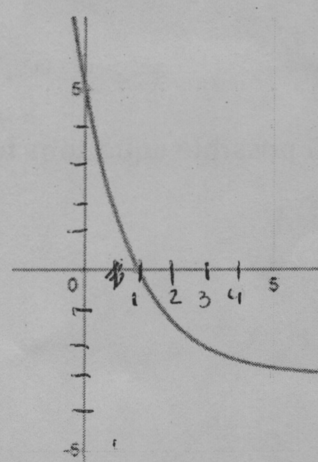


14.) $y = 2^{-(x-6)} + 2$; $y = 2^{-x+6} + 2$; $y = (\frac{1}{2})^{x-6} + 2$

15.) $y = 2^{-(x-3)} - 5$; $y = 2^{-x+3} - 5$; $y = \left(\frac{1}{2}\right)^{x-3} - 5$

16.) $y = 2^{x-1} - 2$; $y = \left(\frac{1}{2}\right)^{-(x-1)} - 2$; $y = \left(\frac{1}{2}\right)^{-x+1} - 2$

LT: 6C
Graphing Parent Functions using Transformations.

Level *

Name the parent function and all the shifts for the following functions.

1.) $f(x) = 2^x - 5$
2.) $f(x) = -|x + 4| - 1$
3.) $f(x) = (x + 1)^2 + 6$
4.) $f(x) = \sqrt{x - 2} + 3$
5.) $f(x) = (x - 6)^{\frac{1}{3}} - 5$

Level **

Graph the following functions

6.) $f(x) = -(x - 3)^2$
7.) $f(x) = (x - 1)^2 + 2$
8.) $f(x) = \sqrt{x + 6}$
9.) $f(x) = \sqrt{x} + 8$
10.) $f(x) = (x + 1)^3$
11.) $f(x) = x^3 - 5$
12.) $f(x) = \sqrt[3]{x + 4} - 2$
13.) $f(x) = |x - 2| + 4$
14.) $f(x) = -|x| + 2$

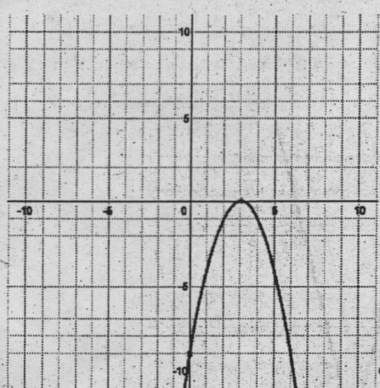
Level ***
Graph the following functions
15.) $f(x) = -2(x - 6)^2 + 5$
16.) $f(x) = \frac{1}{2}\sqrt{x + 3} - 1$
17.) $f(x) = 3(x - 2)^2 + 4$
18.) $f(x) = 4|x - 5| + 2$
19.) $f(x) = \begin{cases} |x + 1| + 2 & x > 1 \\ -(x + 1)^2 + 8 & x \leq 1 \end{cases}$
20.) $f(x) = \begin{cases} x^2 - 4 & x \geq 3 \\ |x - 2| - 1 & -2 \leq x < 3 \\ (x + 4)^3 & x < -2 \end{cases}$

Answer Key

Level *

1.) Exponential function with base 2, moved down 5
2.) Absolute Value function, open downward, left 4 and down 1
3.) Quadratic Function, left1, up 6
4.) Square Root Function, right 2, up 3
5.) Cube Root Function, right 6, down 5

Level **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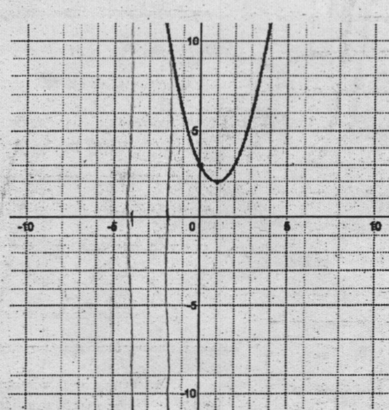
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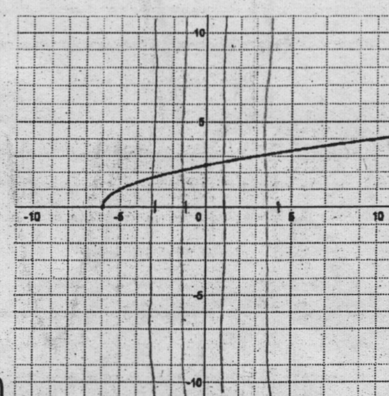
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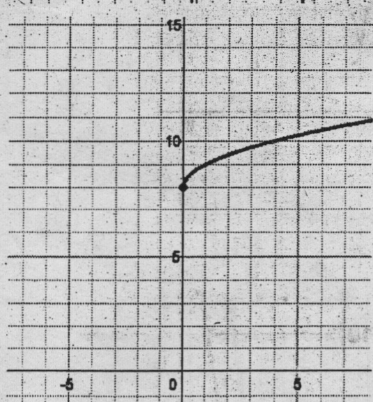
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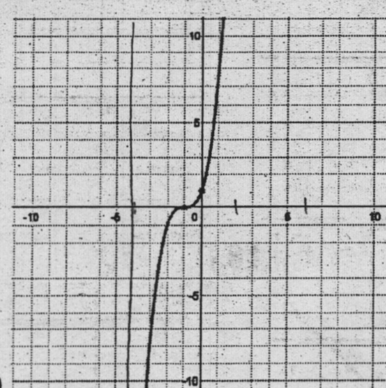
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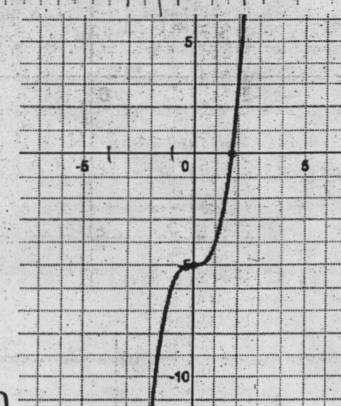
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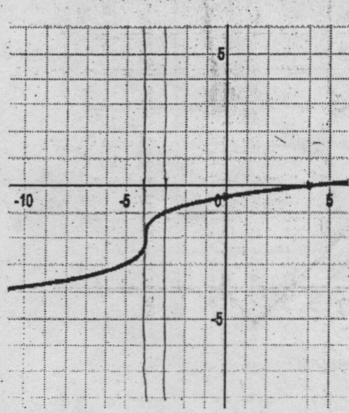
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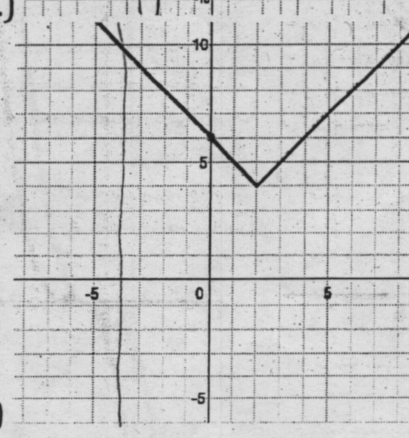
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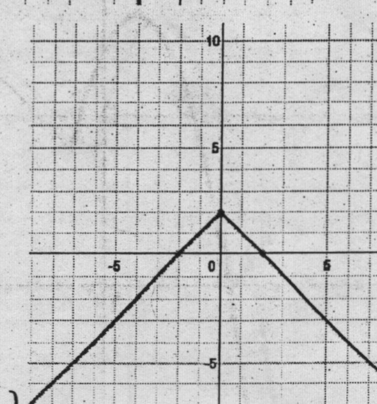
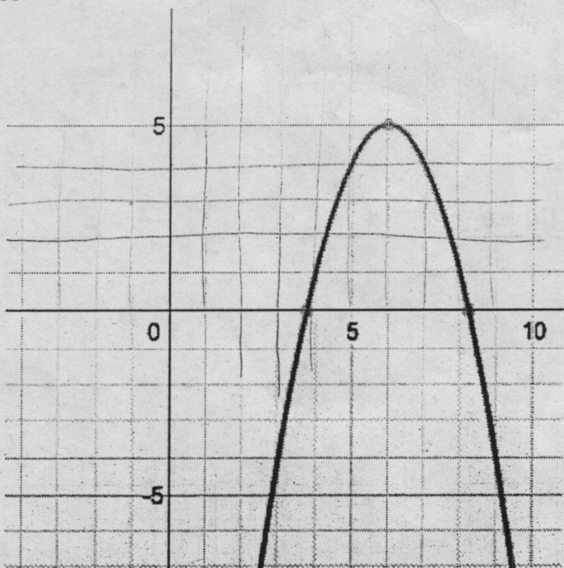

14.)

Level ***

15.)



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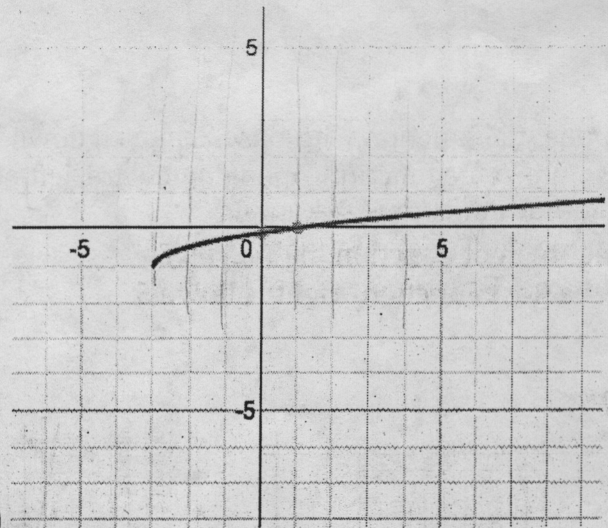

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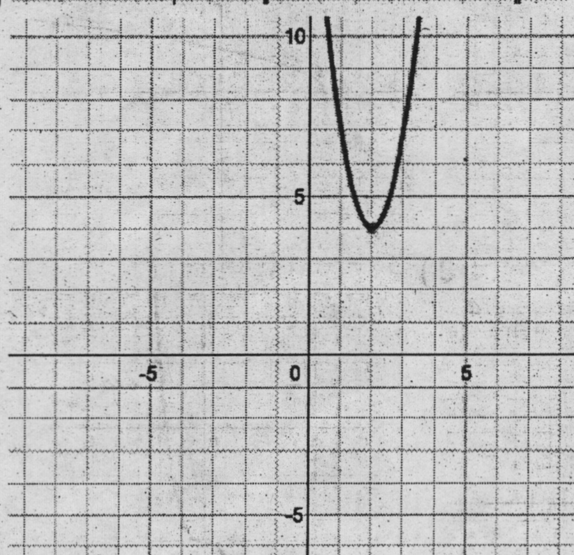

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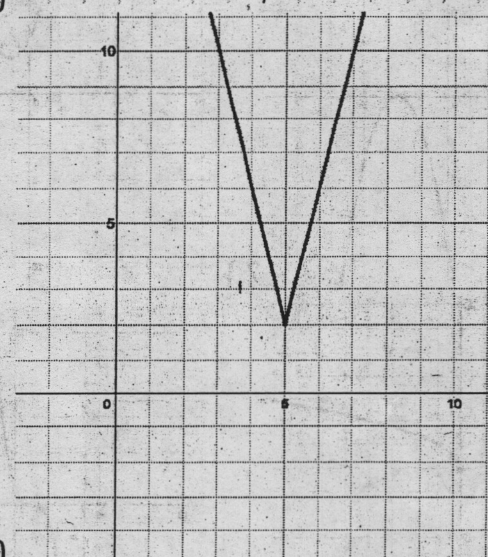

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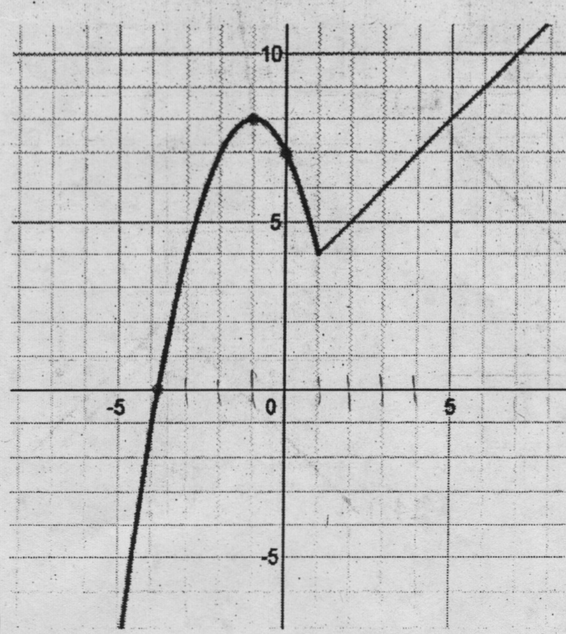

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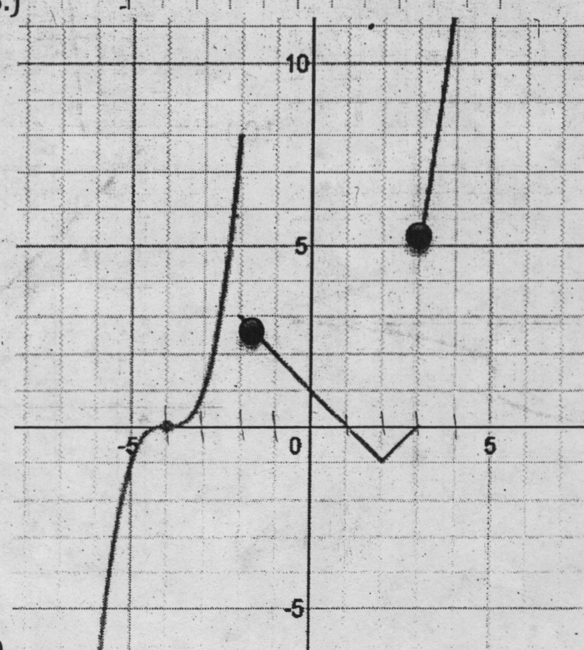
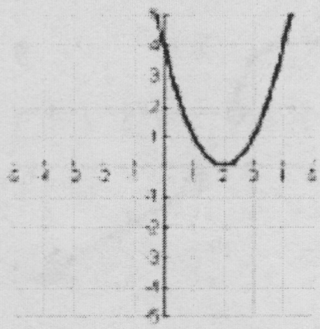


2C	I can define a function and describe its **Domain and Range** graphically, algebraically and numerically and interpret the domain and range for a given situation.

Level *

1.



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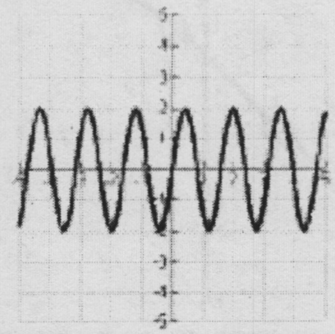

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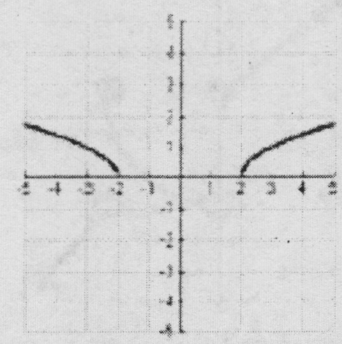

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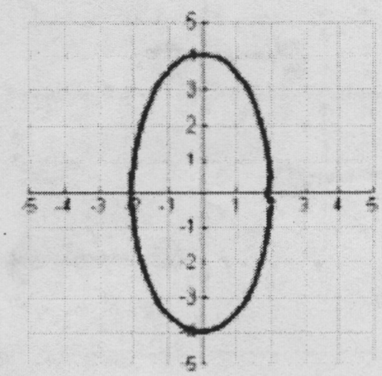

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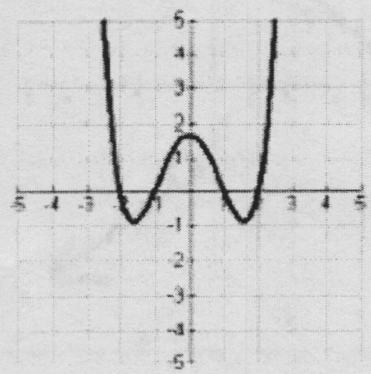
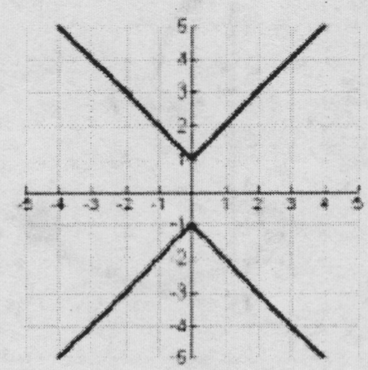


6.



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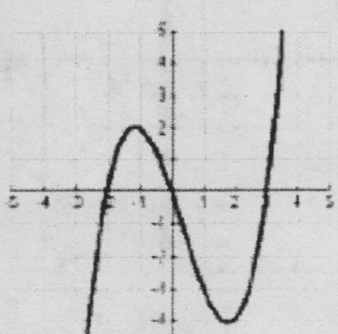

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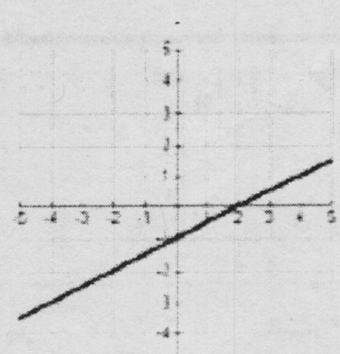

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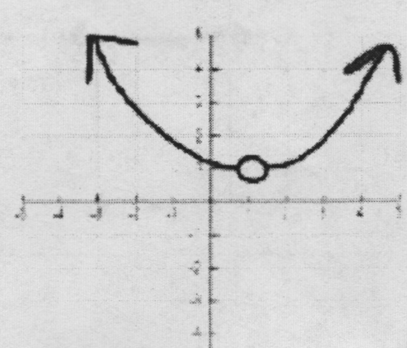
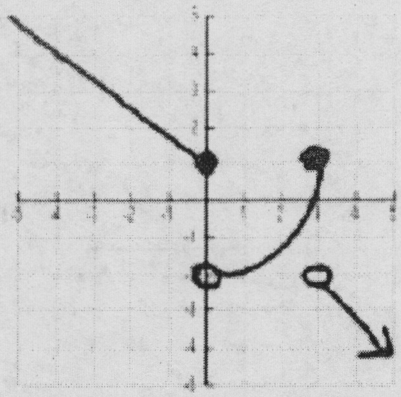


Level **

10.



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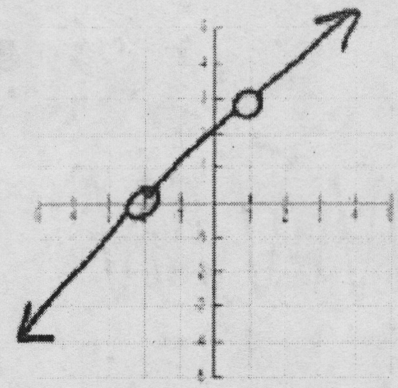

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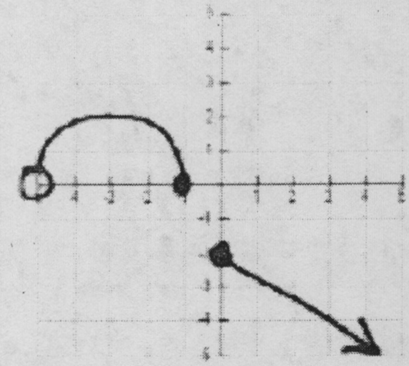

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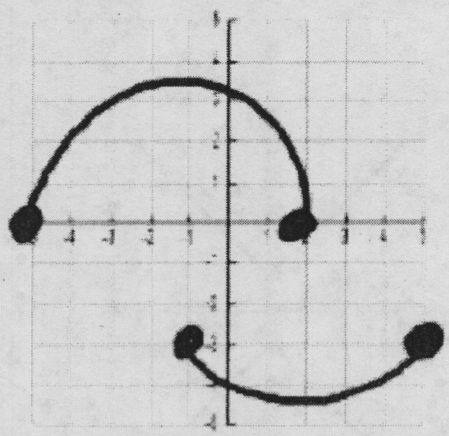

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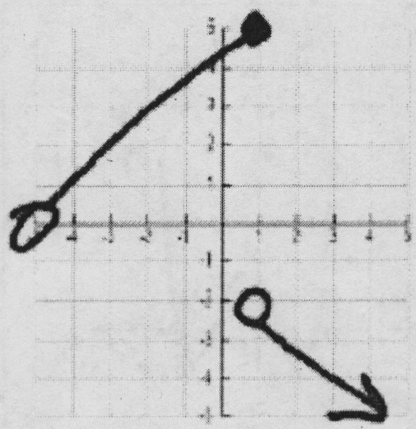

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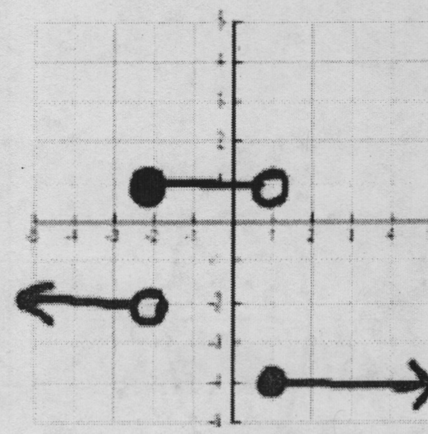

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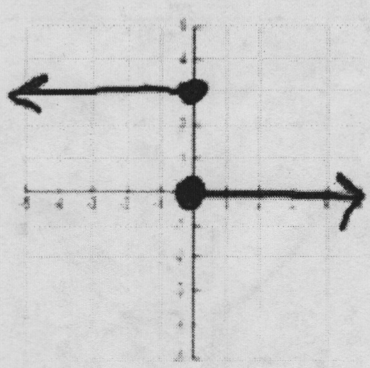

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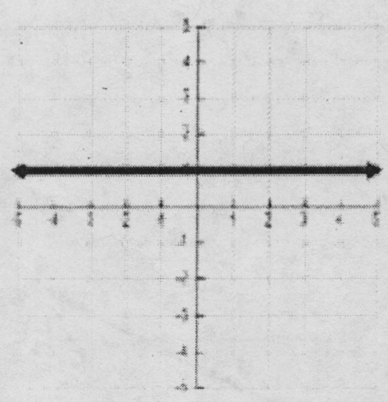

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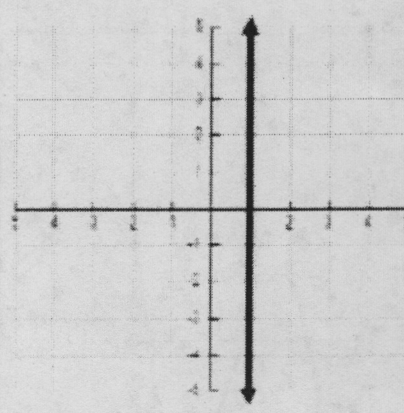
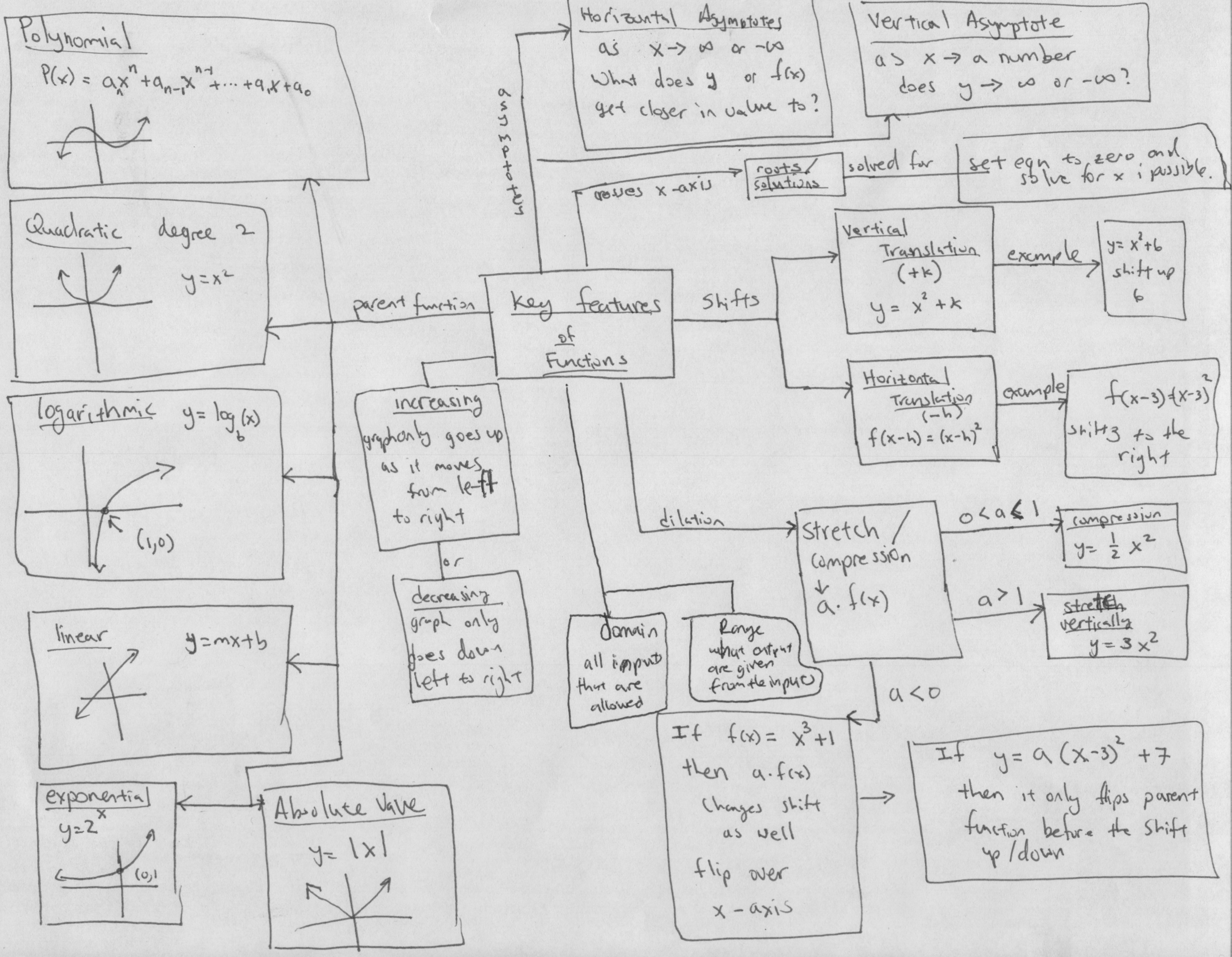


Answers Level *:

1.) D: $(-\infty, \infty)$ R: $[0, \infty)$
2.) D: $(-\infty, \infty)$ R: [-2,2]
3.) D: $(-\infty, -2]U[2, \infty)$ R: $[0, \infty)$
4.) D: [-2,2] R: [-4,4]
5.) D: $(-\infty, \infty)$ R:[-1,∞)
6.) D: $(-\infty, \infty)$ R: $(-\infty, -1]U[1, \infty)$
7.) D: $(-\infty, \infty)$ R: $(-\infty, \infty)$
8.) D: $(-\infty, \infty)$ R: $(-\infty, \infty)$
9.) D: $(-\infty, \infty)$ R: $(1, \infty)$

Answers Level **:

10.) D: $(-\infty, \infty)$ R: $(-\infty, -2)U(-2, \infty)$
11.) D: (-∞, $-2)U(-2,1)U(1, \infty)$
R: $(-\infty, 0)U(0,3)U(1, \infty)$
12.) D: (5,1]U[0,∞) R: $(-\infty, -2]U[0,2]$
13.) D:[-5,5] R: [-4.5,-3]U[0,3.5]
14.) D: $(5, \infty)$ R: (-∞ $- 2)U(0,5]$
15.) D: $(-\infty, \infty)$ R: 4, -3 and 1
16.) D: $(-\infty, \infty)$ R: 0 and 3
17.) D: $(-\infty, \infty)$ R: 1
18.) D: 1 R:$(-\infty, \infty)$


Key features of Functions
parent function
Polynomial
$P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$
Quadratic degree 2
$y = x^2$
logarithmic $y = \log_b(x)$
(1,0)
linear
$y = mx + b$
exponential
$y = 2^x$
(0,1
Absolute Value
$y = |x|$
increasing
graph only goes up as it moves from left to right
or
decreasing
graph only goes down left to right
asymptotes
Horizontal Asymptotes
as $x \to \infty$ or $-\infty$
What does y or f(x) get closer in value to?
Vertical Asymptote
as $x \to$ a number does $y \to \infty$ or $-\infty$?
crosses x-axis
roots/ solutions
solved for
set eqn to zero and solve for x if possible.
Shifts
Vertical Translation (+k)
$y = x^2 + k$
example
$y = x^2 + 6$ shift up 6
Horizontal Translation (−h)
$f(x-h) = (x-h)^2$
example
$f(x-3) = (x-3)^2$ shift 3 to the right
dilation
Stretch / compression
$a \cdot f(x)$
$0 < a \leq 1$
compression
$y = \frac{1}{2} x^2$
$a > 1$
stretch vertically
$y = 3x^2$
$a < 0$
If $f(x) = x^3 + 1$ then $a \cdot f(x)$ changes shift as well flip over x-axis
If $y = a(x-3)^2 + 7$ then it only flips parent function before the shift up/down
Domain
all inputs that are allowed
Range
what output are given from the input