4.1 – Interval Notation with Domain and Range

Writing Domain/Range – Inequality Notation Vs. Interval Notation

– **inequality notation** → rewriting expressions using the six inequality symbols which are …

* You want the variable on the LEFT SIDE!

$<$, $>$, $\leq$, $\geq$, $=$, and $\neq$

– **interval notation** → rewriting inequalities using numbers , infinity symbols $-\infty$ or ∞

If using $-\infty$ or ∞, the grouping symbol will be (or)!

and/or both with grouping symbols such as [ ] and ( )

- brackets represents closed dots and underlined inequalities such as $\leq$, $\geq$, or $=$
- parentheses represents open dots and non-underlined inequalities such as $<$, $>$, or $\neq$
- If you have more than 1 interval (or "area of shading"), then you must use Union Symbol "$\cup$"

Example 1: Complete the chart below using the appropriate notation(s).

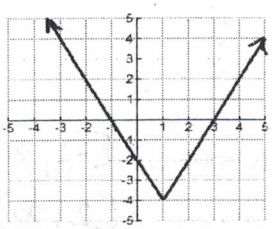
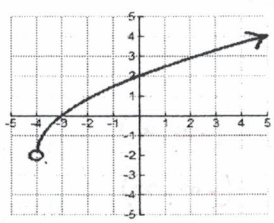
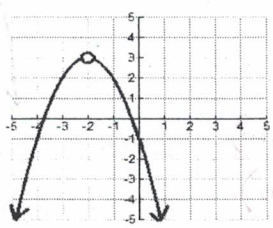
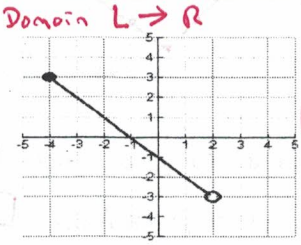
	Inequality Notation	Interval Notation	Graph (on a number line)
a.)	$x > 2$	$(2, \infty)$	
b.)	$x \leq -1$	$(-\infty, -1]$	
c.)	"AND" $-4 < x \leq 0$	$(-4, 0]$	
d.)	all real numbers (IR)	$(-\infty, \infty)$	
e.)	IR , $x \neq -3$	$(-\infty, -3) \cup (-3, \infty)$	
f.)	"OR" $x < -2$ or $x \geq 1$	$(-\infty, -2) \cup [1, \infty)$	
g.)	$x \geq -3$, $x \neq 0$	$[-3, 0) \cup (0, \infty)$	

IR

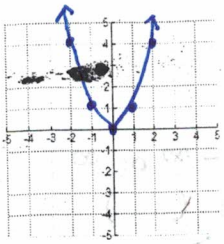
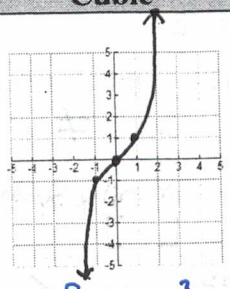
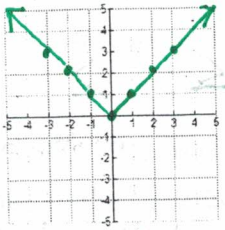
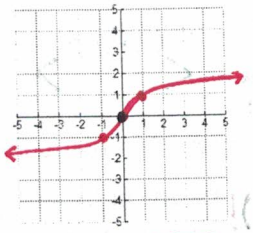
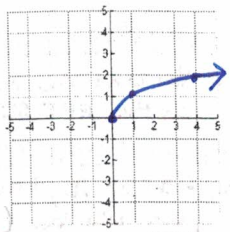
– **domain (of a graph)** → set of all x-values in which a function is defined (look left to right) on x-axis

– **range (of a graph)** → set of all y-values in which a function is defined (look bottom to top) on y-axis

Example 2: Determine the domain and range (using interval notation) of each given graph.

Example 2a	Example 2b	Example 2c	Example 2d
			Domain L → R  T Range ↑ B
D/R – Using an Interval D: $(-\infty, \infty)$ R: $[-4, \infty)$	**D/R – Using an Interval** D: $(-4, \infty)$ R: $(-2, \infty)$	**D/R – Using an Interval** D: $(-\infty, -2) \cup (-2, \infty)$ R: $(-\infty, 3)$	**D/R – Using an Interval** D: $[-4, 2)$ R: $(-3, 3]$
Absolute Value Function	Square Root Function	Quadratic Function	Linear

Basic Parent Functions For Transformations

Quadratic	Cubic	Absolute Value	Cube Root	Square Root
				
Eq: $f(x) = x^2$	Eq: $f(x) = x^3$	Eq: $f(x) = \lvert x \rvert$	Eq: $f(x) = \sqrt[3]{x}$	Eq: $f(x) = \sqrt{x} \rightarrow x^{1/2}$
D: $(-\infty, \infty)$	D: $(-\infty, \infty)$	D: $(-\infty, \infty)$	D: $(-\infty, \infty)$	D: $[0, \infty)$
R: $[0, \infty)$	R: $(-\infty, \infty)$	R: $[0, \infty)$	R: $(-\infty, \infty)$	R: $[0, \infty)$

Transformation # 1 – Vertical Translations	Transformation # 2 – Horizontal Translations
If have $y = f(x) \pm d$ then you can have slide ↑ or ↓	If have $y = f(x \pm c)$ then you can have slide ← or →
• + d which means translates UP "d" units	• $\pm$ c which means translates LEFT "c" units
• – d which means translates DOWN "d" units	• $\ominus$ c which means translates RIGHT "c" units

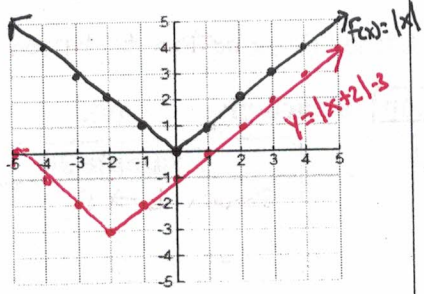
Example 3: Do the following – a.) Draw in the original parent graph in BLACK.
b.) State all the transformations in the given function.
c.) Graph the function based on its transformations in COLOR.
d.) State the domain and range of graphed/transformed function only using interval notation.

Example 3a

Given Function: $y = |x + 2| - 3$

$y = |x|$ parent

Transformations: left 2, down 3



Domain (of given funct): $(-\infty, \infty)$

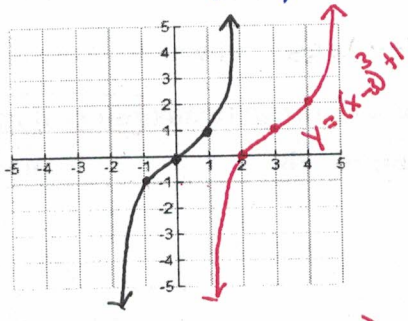
Range (of given funct): $[-3, \infty)$

Example 3b

Given Function: $y = (x - 3)^3 + 1$

$y = x^3$ parent

Transformations: right 3, up 1



Domain (of given funct): $(-\infty, \infty)$

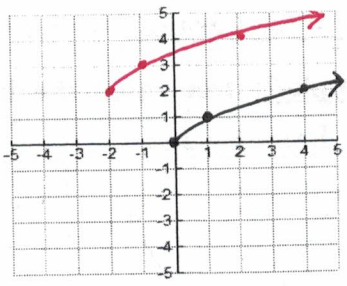
Range (of given funct): $(-\infty, \infty)$

Example 3c

Given Function: $y = \sqrt{x + 2} + 2$

$y = \sqrt{x}$ (Parent)

Transformations: left 2, up 2



Domain (of given funct): $[-2, \infty)$

Range (of given funct): $[2, \infty)$