Functions/Regression – Interval Notation with Domain and Range

Writing Domain/Range – Inequality Notation Vs. Interval Notation

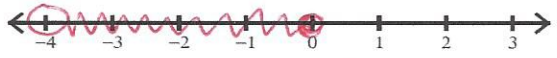
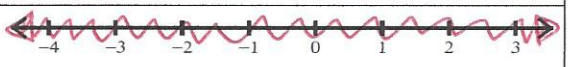
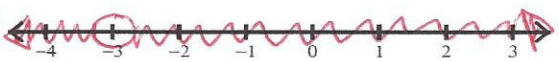
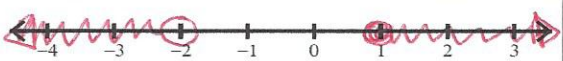
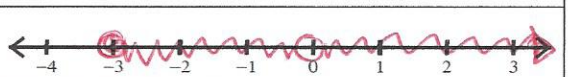
inequality notation → rewriting expressions using the six inequality symbols which are …

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

interval notation → rewriting inequalities using numbers , infinity symbols ($-\infty$ or ∞) and/or both with grouping symbols such as brackets and parentheses

- brackets represents closed dots + underlined inequalities such as $\leq$, $\geq$, or $=$
- parentheses represents open dots + not underlined inequalities such as $<$, $>$, or $\neq$
- If you have more than 1 interval (or "area of shading"), then you must use union symbol

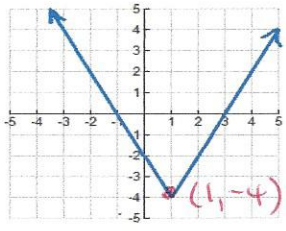
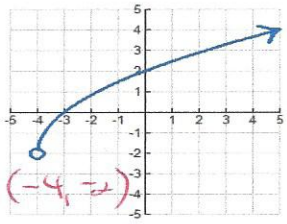
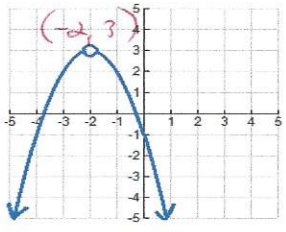
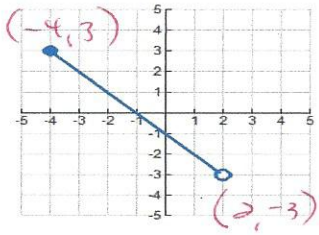
Example 1: Complete the chart below using the appropriate notation(s).

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

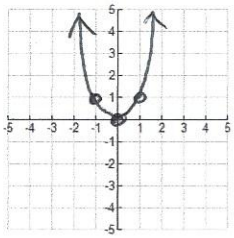
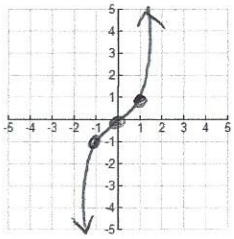
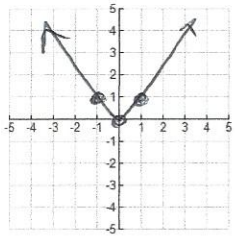
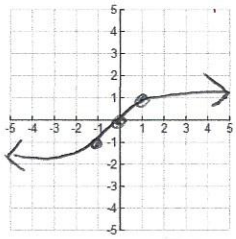
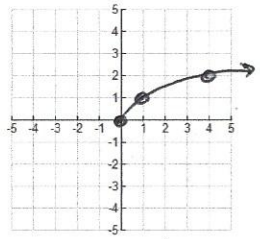
– **domain (of a graph)** → set of all x-values in which a function is defined (look L → R)

– **range (of a graph)** → set of all y-values in which a function is defined (look B → T)

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

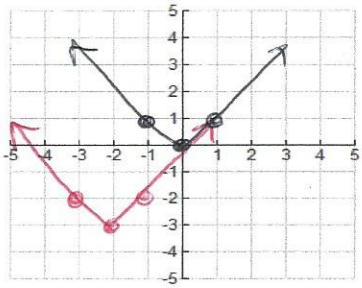
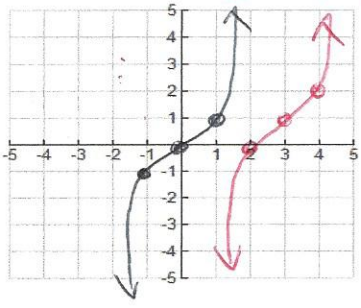
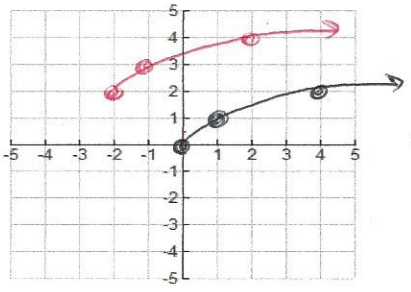
Example 2a	Example 2b	Example 2c	Example 2d
			
D/R – Using an Interval D: $(-\infty, \infty)$ R: $[-4, \infty)$	**D/R – Using an Interval** D: $(-4, \infty)$ R: $(-2, \infty)$	**D/R – Using an Interval** D: $(-\infty, -2) \cup (-2, \infty)$ R: $(-\infty, 3)$	**D/R – Using an Interval** D: $[-4, 2)$ R: $(-3, 3]$

Basic Parent Functions For Transformations

Quadratic	Cubic	Absolute Value	Cube Root	Square Root
				
Eq: $y = x^2$	Eq: $y = x^3$	Eq: $y = \lvert x \rvert$	Eq: $y = \sqrt[3]{x}$	Eq: $y = \sqrt{x}$
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 …	If have $y = f(x \pm c)$ then you can have …
• + d which means translate up "d" units	• + c which means translate left "c" units
• – d which means translate down "d" units	• – c which means translate 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	Example 3b	Example 3c
Given Function: $y = \lvert x + 2 \rvert - 3$	Given Function: $y = (x - 3)^3 + 1$	Given Function: $y = \sqrt{x+2} + 2$
Transformations: left 2, down 3	Transformations: right 3, up 1	Transformations: left 2, up 2
		
Domain (of given funct): $(-\infty, \infty)$	Domain (of given funct): $(-\infty, \infty)$	Domain (of given funct): $[-2, \infty)$
Range (of given funct): $[-3, \infty)$	Range (of given funct): $(-\infty, \infty)$	Range (of given funct): $[2, \infty)$