

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 ...

<, >, ≤, ≥, =, and ≠

– 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 ≤, ≥, or =
- parentheses represents open dots + ^{not} underlined inequalities such as <, >, or ≠
- 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.)	$\text{IR}, x \neq -3$	$(-\infty, -3) \cup (-3, \infty)$	
f.)	$x < -2$ or $x \geq 1$	$(-\infty, -2) \cup [1, \infty)$	
g.)	$x \geq -3, x \neq 0$	$[-3, 0) \cup (0, \infty)$	

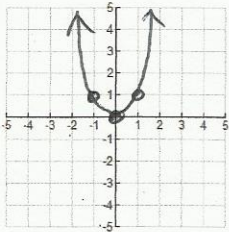
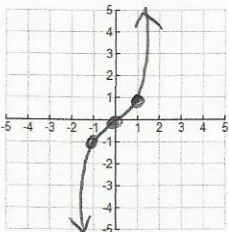
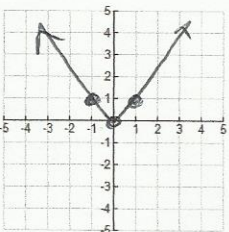
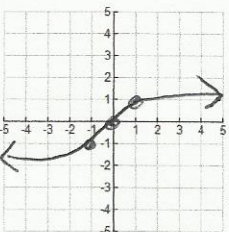
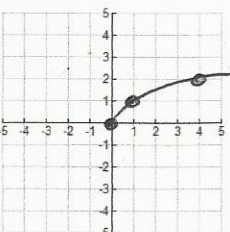
– domain (of a graph) → set of all x-values in which a function is defined (look L → R)

– 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.

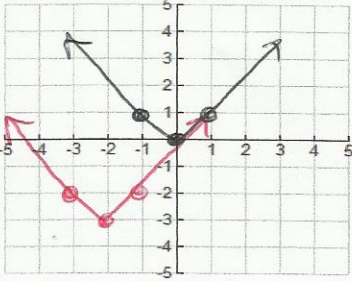
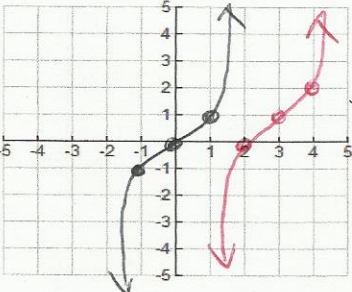
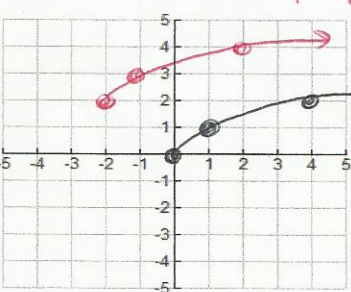
Example 2a	Example 2b	Example 2c	Example 2d
D/R – Using an Interval D: $(-\infty, \infty)$ R: $[-4, \infty)$	D/R – Using an Interval D: $(-4, \infty)$ R: $(-2, \infty)$	D/R – Using an Interval D: $(-\infty, -2) \cup (-2, \infty)$ R: $(-\infty, 3)$	D/R – Using an Interval D: $[-4, 2)$ R: $(-3, 3]$

Basic Parent Functions For Transformations

Quadratic	Cubic	Absolute Value	Cube Root	Square Root
				
Eq: $y = x^2$	Eq: $y = x^3$	Eq: $y = x $	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
<p>If have $y = f(x) \pm d$ then you can have ...</p> <ul style="list-style-type: none"> $+d$ which means <u>translate up "d" units</u> $-d$ which means <u>translate down "d" units</u> 	<p>If have $y = f(x \pm c)$ then you can have ...</p> <ul style="list-style-type: none"> $+c$ which means <u>translate left "c" units</u> $-c$ which means <u>translate right "c" units</u>

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

Example 3a	Example 3b	Example 3c
<p>Given Function: $y = x + 2 - 3$</p> <p>Transformations: <u>left 2, down 3</u></p>  <p>Domain (of given function): <u>$(-\infty, \infty)$</u></p> <p>Range (of given function): <u>$[-3, \infty)$</u></p>	<p>Given Function: $y = (x - 3)^3 + 1$</p> <p>Transformations: <u>right 3, up 1</u></p>  <p>Domain (of given function): <u>$(-\infty, \infty)$</u></p> <p>Range (of given function): <u>$(-\infty, \infty)$</u></p>	<p>Given Function: $y = \sqrt{x + 2} + 2$</p> <p>Transformations: <u>left 2, up 2</u></p>  <p>Domain (of given function): <u>$[-2, \infty)$</u></p> <p>Range (of given function): <u>$[2, \infty)$</u></p>