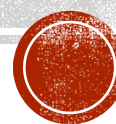# PARENT GRAPHS & TRANSFORMATIONS OF FUNCTIONS
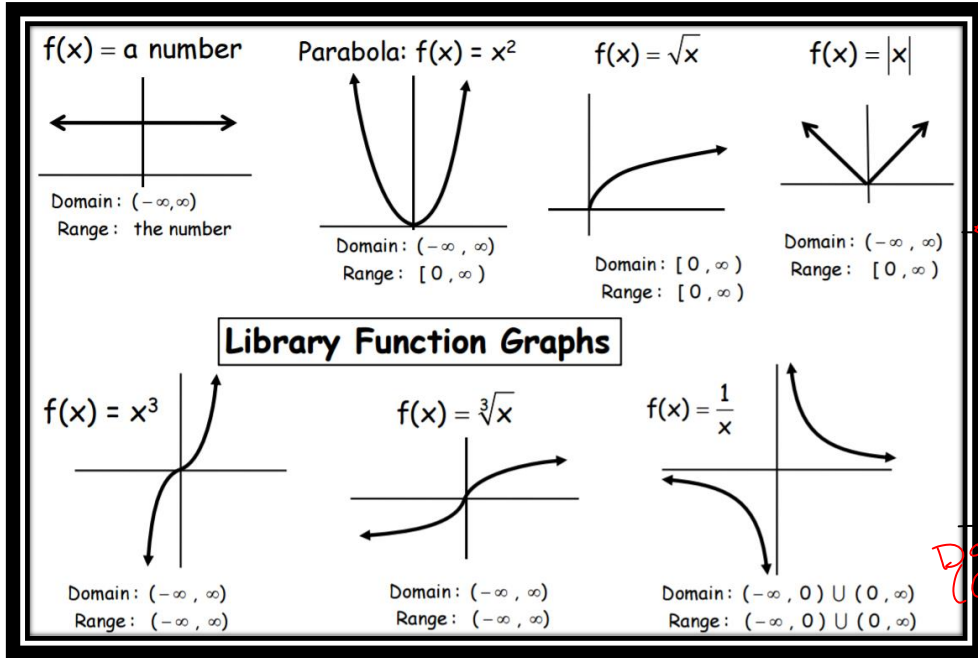
Honors Calculus

Keeper 1.5

1

- Highlight answers & turn in to the basket.

- Pick up stapled packet in front of the basket. These are pictures for your keeper.

- You will need to cut out the 1st 2 graphics for today's notes. Scissors and glue are in the cabinet by the door if you need to borrow them.

2

Library Function Graphs

- $f(x) = $ a number — Domain: $(-\infty, \infty)$, Range: the number
- Parabola: $f(x) = x^2$ — Domain: $(-\infty, \infty)$, Range: $[0, \infty)$
- $f(x) = \sqrt{x}$ — Domain: $[0, \infty)$, Range: $[0, \infty)$
- $f(x) = |x|$ — Domain: $(-\infty, \infty)$, Range: $[0, \infty)$
- $f(x) = x^3$ — Domain: $(-\infty, \infty)$, Range: $(-\infty, \infty)$
- $f(x) = \sqrt[3]{x}$ — Domain: $(-\infty, \infty)$, Range: $(-\infty, \infty)$
- $f(x) = \dfrac{1}{x}$ — Domain: $(-\infty, 0) \cup (0, \infty)$, Range: $(-\infty, 0) \cup (0, \infty)$

(handwritten) $f(x) = e^x$ Domain $(-\infty, \infty)$

(handwritten) $f(x) = \ln x$ or $\log_e x$ Domain $(0, \infty)$

3

RULES FOR TRANSFORMATION OF FUNCTIONS

Transformation	Function	Description
Horizontal Shift	$f(x + h)$	Shift left h units
	$f(x - h)$	Shift right h units
Vertical Shift	$f(x) + k$	Shift up k units
	$f(x) - k$	Shift down k units
Reflection	$-f(x)$	Reflect across x-axis
	$f(-x)$	Reflect across y-axis
Vertical Stretch/Compress	$a\, f(x),\ a > 1$	Stretch vertically by a factor of a
	$a\, f(x),\ 0 < a < 1$	Compress vertically by a factor of a
Horizontal Stretch/Compress	$f(ax),\ a > 1$	Compress horizontally by a factor of $\dfrac{1}{a}$
	$f(ax),\ 0 < a < 1$	Stretch horizontally by a factor of $\dfrac{1}{a}$

(handwritten) opposite sign of what you see

(handwritten) Shrink

4

p.

DESCRIBE THE TRANSFORMATION & ~~SKETCH THE GRAPH~~

$$f(x) = a(x-h)^2 + K$$

1. $g(x) = \dfrac{2}{3}x^2 - 1$ Quadratic

$a = \dfrac{2}{3}$ Vertical shrink by 2/3

$h = 0$

$K = -1$ shift down 1

5

2. $g(x) = 2|x - 1|$

Absolute
Value

$a|x - h| + K$

$a = 2$ vert stretch by 2

$h = 1$ shifts right 1

6

3

3. $g(x) = -2(x+1)^2 + 3$

A   Oh   K

$a(x-h)^2 + K$

$a = -2 = -1 \cdot 2$ reflect over x-axis
           & vert. stretch by 2

$h = -1$ left 1
$K = 3$ up 3

7

4. $g(x) = -3e^{x-6} + \pi$

Exponential $a \cdot b^{x-h} + K$

Reflect over x-axis
Stretch by 3
Right 6
Up π

8

4