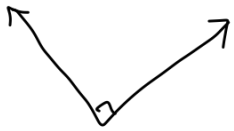
Chapter 3.5 Notes
Graphing transformations

1.) Square function

$y = x^2$

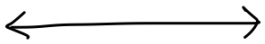
Absolute value function

$y = |x|$



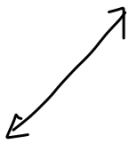
Constant function

$y = b$



Identity function

$y = x$



Square root function

$y = \sqrt{x}$

Cube root function

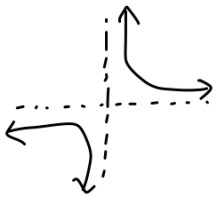
$y = \sqrt[3]{x}$

Cube function

$y = x^3$

Reciprocal function

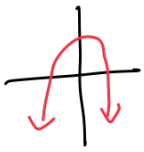
$y = \frac{1}{x}$



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

flip upside down

shift up



$y = (x-6)^2$

shift right

$y = -|x+4|$

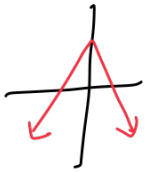
flip upside down

shift left

$y = -|x| + 4$

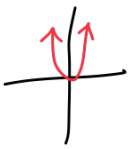
flip upside down

shift up



3.) $y = 2x^2$

gets skinnier



$y = x^2 + 2$

shift up

$y = -5|x|$

flip upside down

gets skinnier

$y = |x| + 5$

shift up

* a negative out in front of everything tells you the function is upside down

ex.) $-x^2$ →

x^2 →

* If there is a number just added or subtracted from the end, it means to shift up or down.

ex.) x^2+2

x^2-2

* If there is a number that is added or subtracted, but it is inside the ( ), $\sqrt{\ }$, or | |, then you shift left or right.

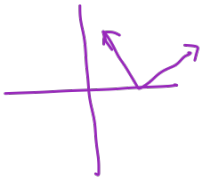
ex.)

(x^2+2)

goes left

$|x-2|$

goes right



$\sqrt{x+3}$

goes left

4.) $y = -(x+5)^2$

flip upside-down

shift left

$y = -5x^2$

flip upside-down

gets skinnier

$y = |x-2|$

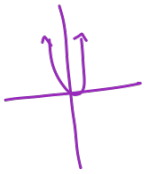
shift right

$y = 2|x|$

gets skinnier

* Just a number out in front of everything makes the graph skinnier.

ex) $5x^2$



5. Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Find the domain and range of the function.

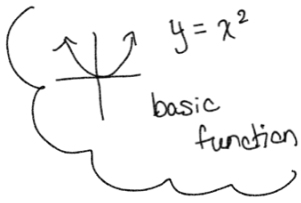
$g(x) = x^2 - 4$

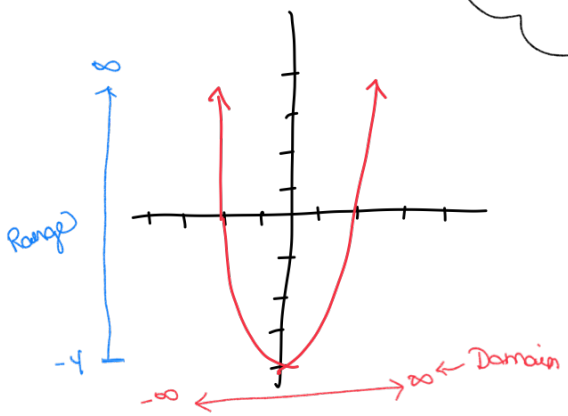
shifts down

* this is a vertical shift down

domain : $(-\infty, \infty)$

range : $[-4, \infty)$





To Graph: We know that x^2 looks like U.

① Press on [U] in the top right.

② Click anywhere on the graph.

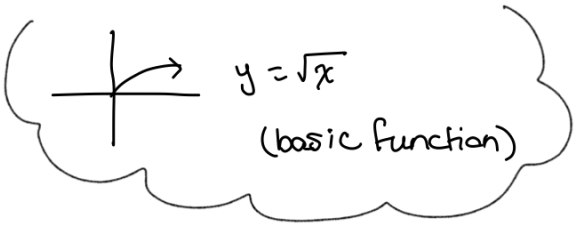
③ Boxes will appear.
- Look for vertical shift + here it goes down to -4.

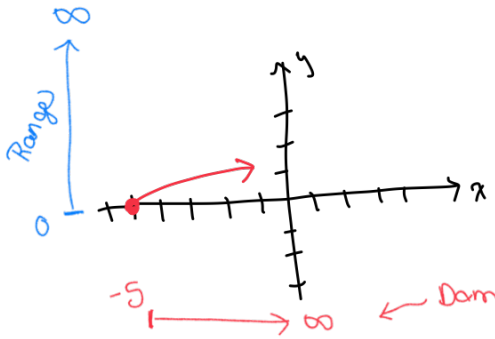
④ Then save + submit.

6. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown. Find the domain and the range of the function.

$h(x) = \sqrt{x+5}$

↑ horizontal shift to the left





Domain = $[-5, \infty)$

Range = $[0, \infty)$

* Tip: If it touches the line on that point, then put a [around the number. If it gets close but doesn't touch the number then put (around it.

7. Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and /or reflecting. Find the domain and range of the function.

$g(x) = (x-1)^3 - 4$

↑ shifts horizontaly right

↑ Shifts vertically down

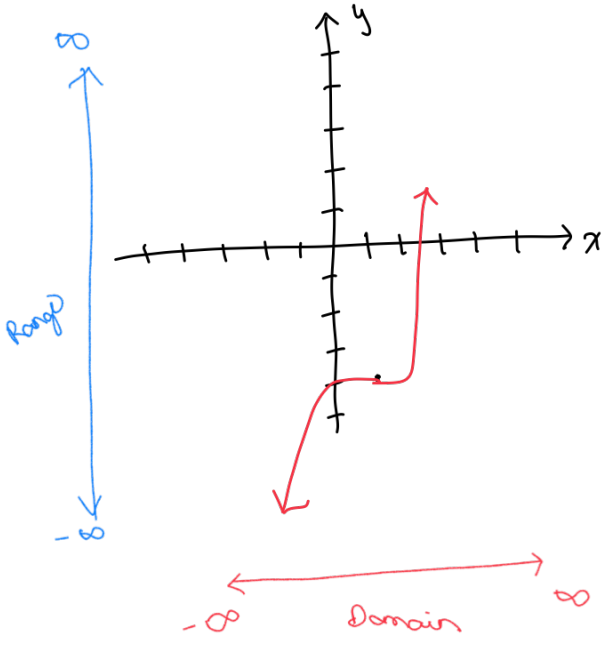
To Graph: We know that x^3 looks like ⤴

① Press on ⤴ in the top right.

② Click anywhere on the graph.

③ Boxes will appear.

- Look for vertical shift + here it goes down to -4.
- Then look for horizontal shift, here it will go right by 1 unit.

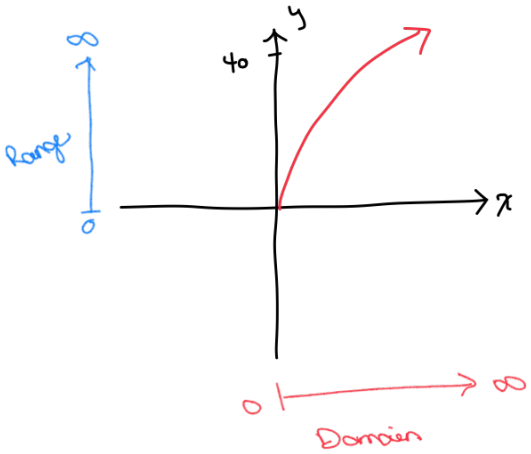


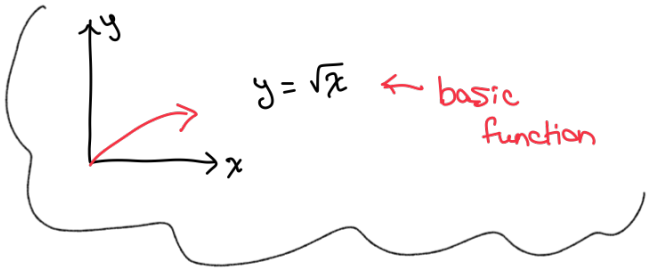
Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

8. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown. Find the domain and the range of the function.

$g(x) = 12\sqrt{x}$ ← makes it get taller



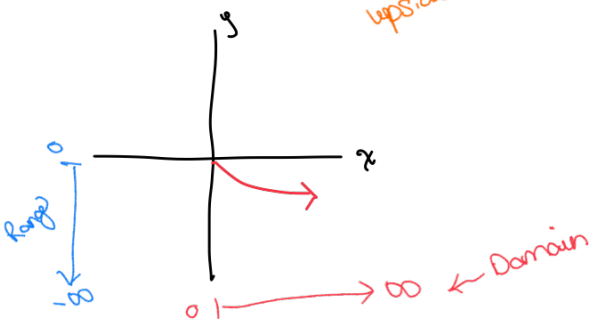


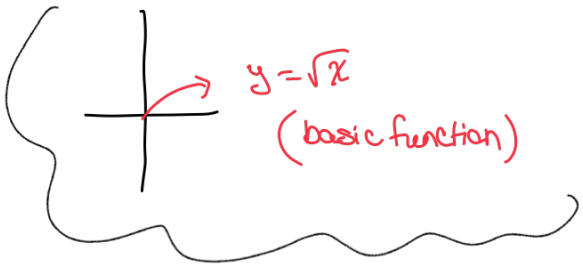
Domain: $[0, \infty)$

Range: $[0, \infty)$

9. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown. Find the domain and the range of the function.

$f(x) = -\sqrt{x}$ ← flips it upside down





Domain: $[0, \infty)$

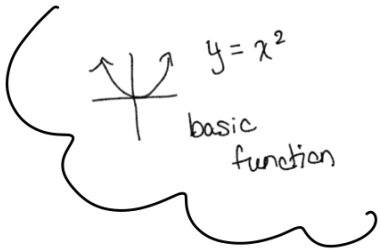
Range: $(-\infty, 0]$

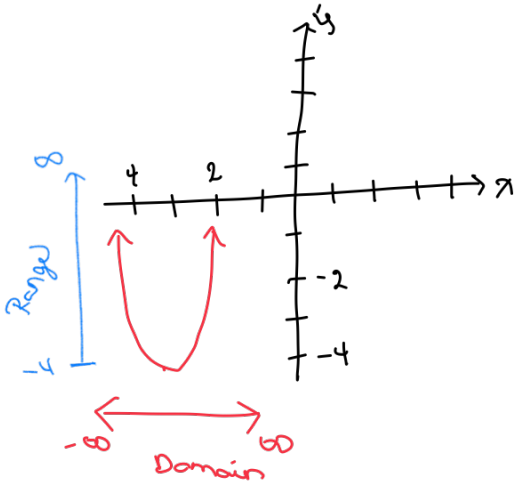
10. Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and /or reflecting. Find the domain and range of the function.

$g(x) = 2(x+3)^2 - 4$ ← vertical shift down

2: vertical stretch

$(x+3)$: horizontal shift left





Domain: $(-\infty, \infty)$

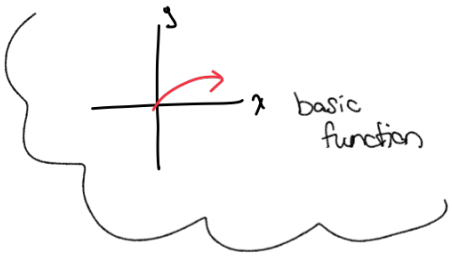
Range: $[-4, \infty)$

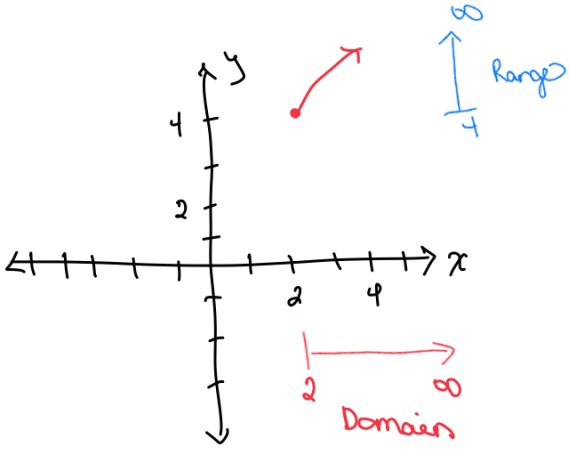
11. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown. Find the domain and the range of the function.

$g(x) = 4\sqrt{x-2} + 4$ ← vertical shift up

4: vertical stretch

$(x-2)$: horizontal shift right





Domain: $[2, \infty)$

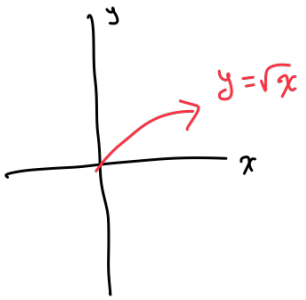
Range: $[4, \infty)$

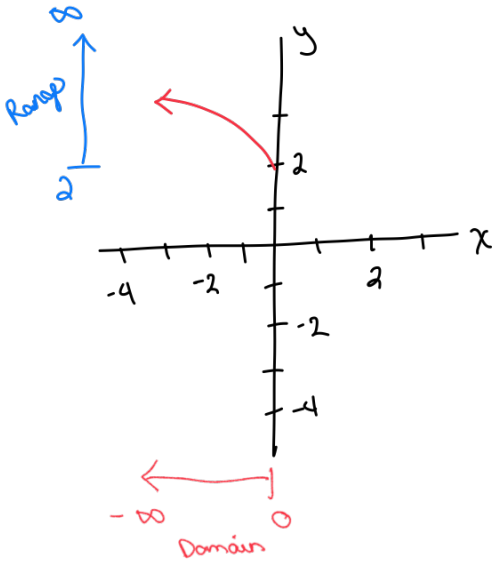
12. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown. Find the domain and the range of the function.

$h(x) = \sqrt{-x} + 2$

reflect over y-axis

vertical shift up





Domain: $(-\infty, 0]$

Range: $[2, \infty)$

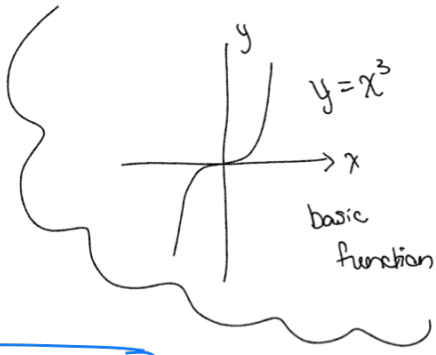
13. Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and /or reflecting. Find the domain and range of the function.

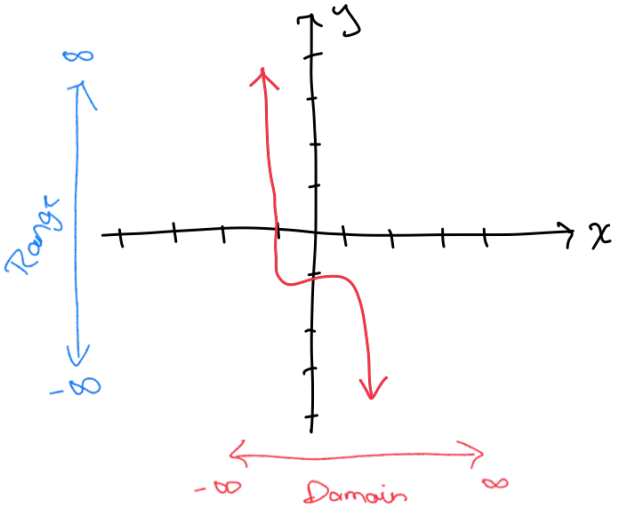
$f(x) = -(x+1)^3 - 1$

vertical shift down

flip over y-axis

horizontal shift left





Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$