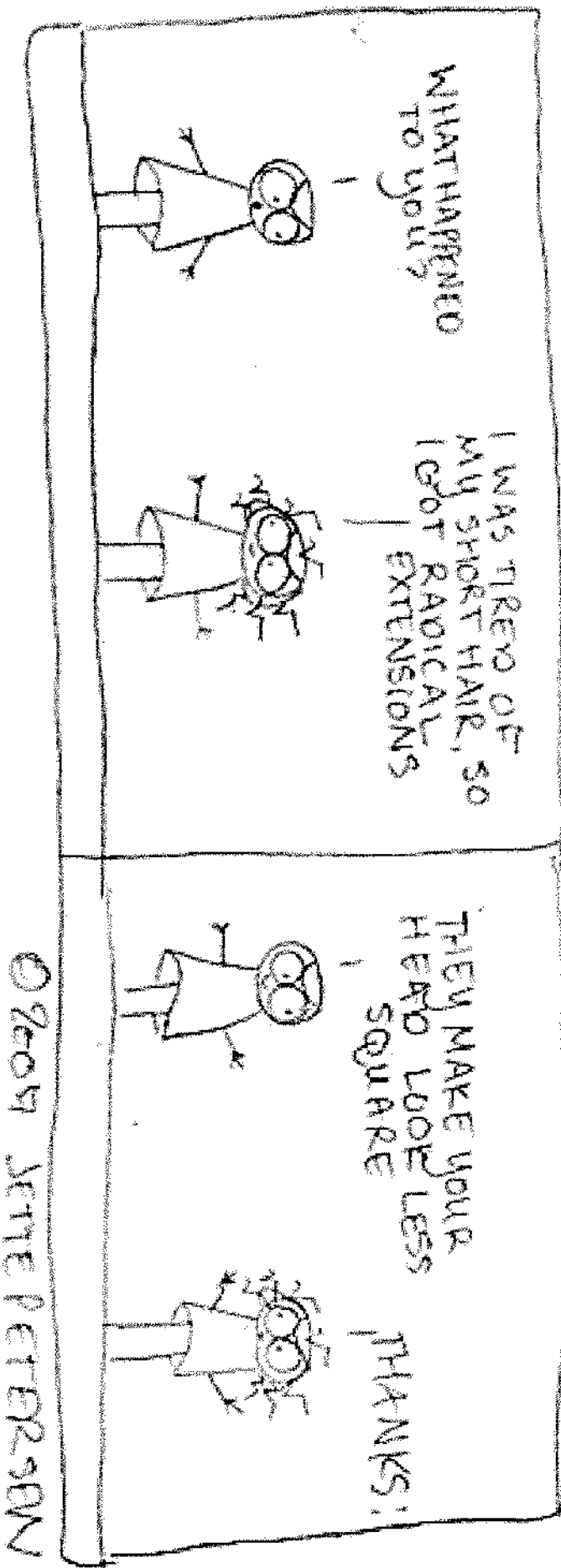


A2: Graphs of Square Root & Cube Root Functions

Notes



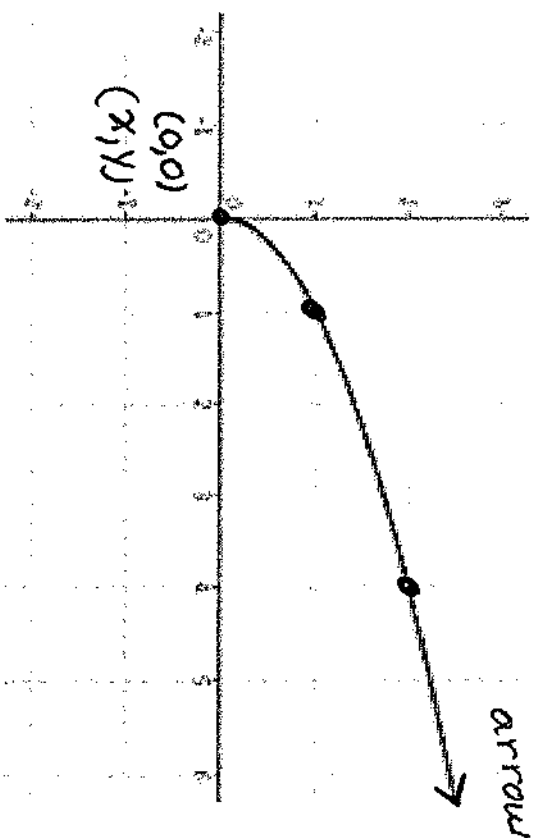
Square Root Graphs

Library
of
Functions
(LOF)

Parent Function: $f(x) = \sqrt{x}$

$$\begin{aligned}\sqrt{0} &= 0 \\ \sqrt{1} &= 1 \\ \sqrt{4} &= 2 \\ \sqrt{9} &= 3\end{aligned}$$

Graph:



<i>Perfect Squares</i>	X	Y
*	0	0
	1	1
	4	2
	9	3

"Interval Notation"

Domain:

$$[0, \infty)$$

Range:

$$[0, \infty)$$

ex: Sketch and state the domain and range in interval notation.

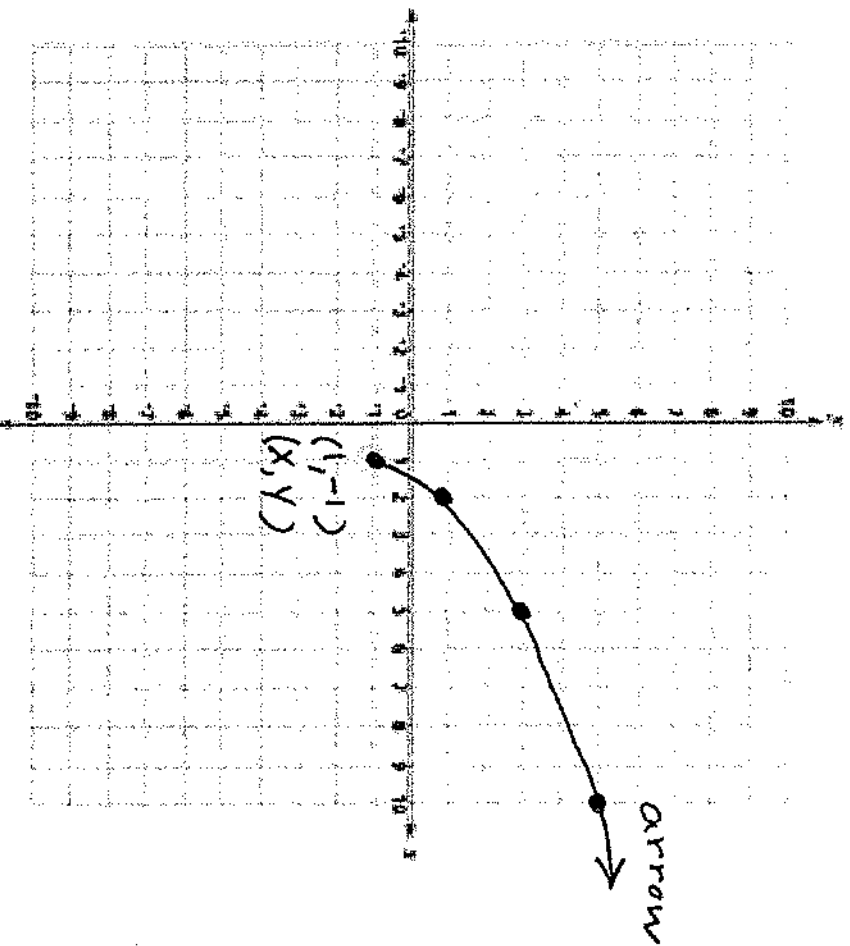
a) $y = 2\sqrt{x-1} - 1$

Set radicand = 0, 1, 4, 9 perfect squares

$$x-1 = \dots$$

X	Y
1	-1
2	1
5	3
10	5

$x-1=0$ $x=1$
$x-1=1$ $x=2$
$x-1=4$ $x=5$
$x-1=9$ $x=10$



Domain: $[1, \infty)$	Range: $[-1, \infty)$
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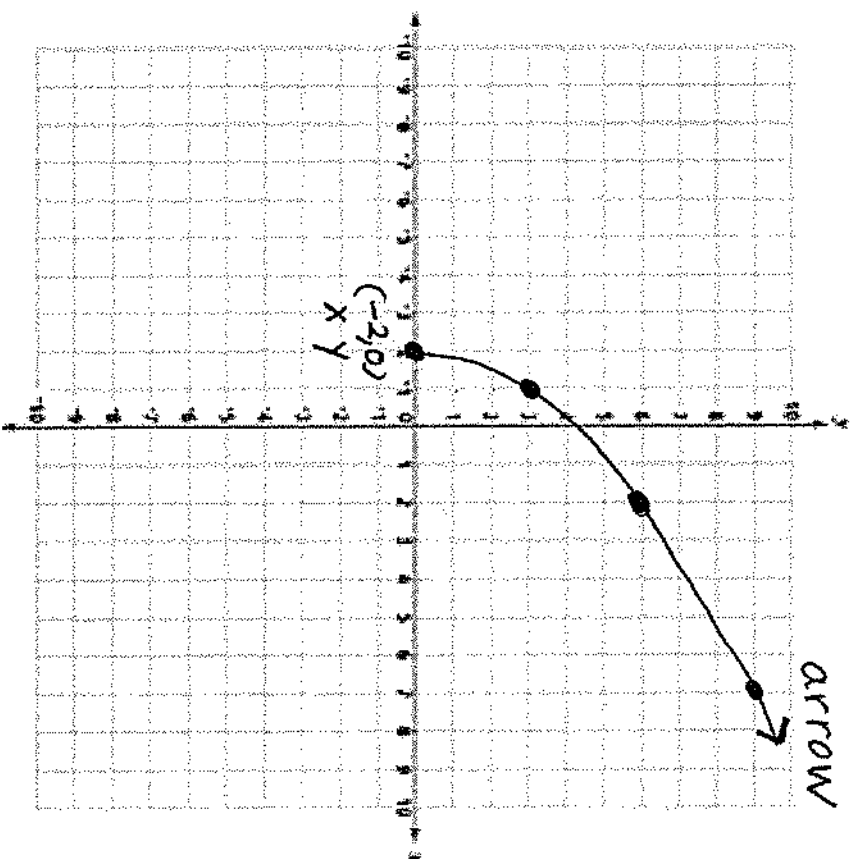
ex: Sketch and state the domain and range in interval notation.

Set radicand = 0, 1, 4, 9 perfect squares

b) $y = 3\sqrt{x+2}$

x	y
-2	0
-1	3
2	6
7	9

$x+2=0$ $x=-2$
$x+2=1$ $x=-1$
$x+2=4$ $x=2$
$x+2=9$ $x=7$



Domain:

$[-2, \infty)$

Range:

$[0, \infty)$

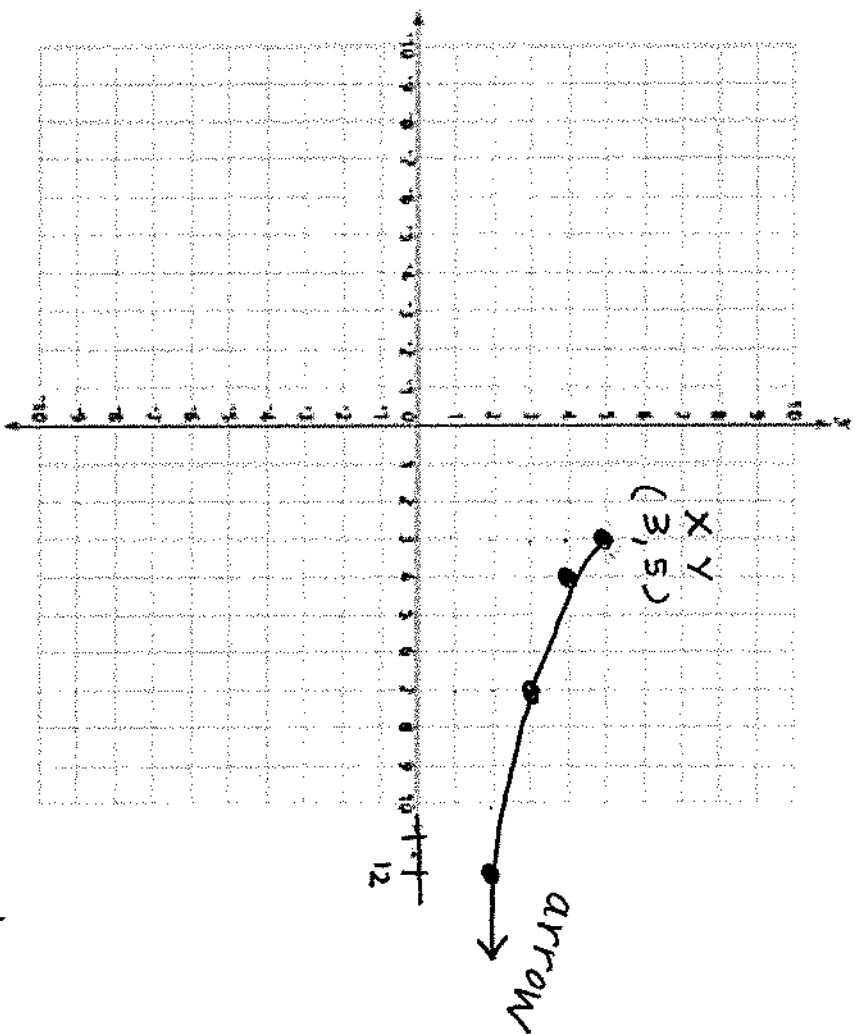
ex: Sketch and state the domain and range in interval notation.

c) $y = -\sqrt{x-3} + 5$

Set radicand = 0, 1, 4, 9 perfect squares
 $x-3 =$

X	Y
3	5
4	4
7	3
12	2

$x-3 = 0$ $x = 3$
$x-3 = 1$ $x = 4$
$x-3 = 4$ $x = 7$
$x-3 = 9$ $x = 12$



Domain: $[3, \infty)$	Range: $(-\infty, 5]$
--------------------------	--------------------------

NOT
 ~~$[5, \infty)$~~
 Wrong order!

ex: Sketch and state the domain and range in interval notation.

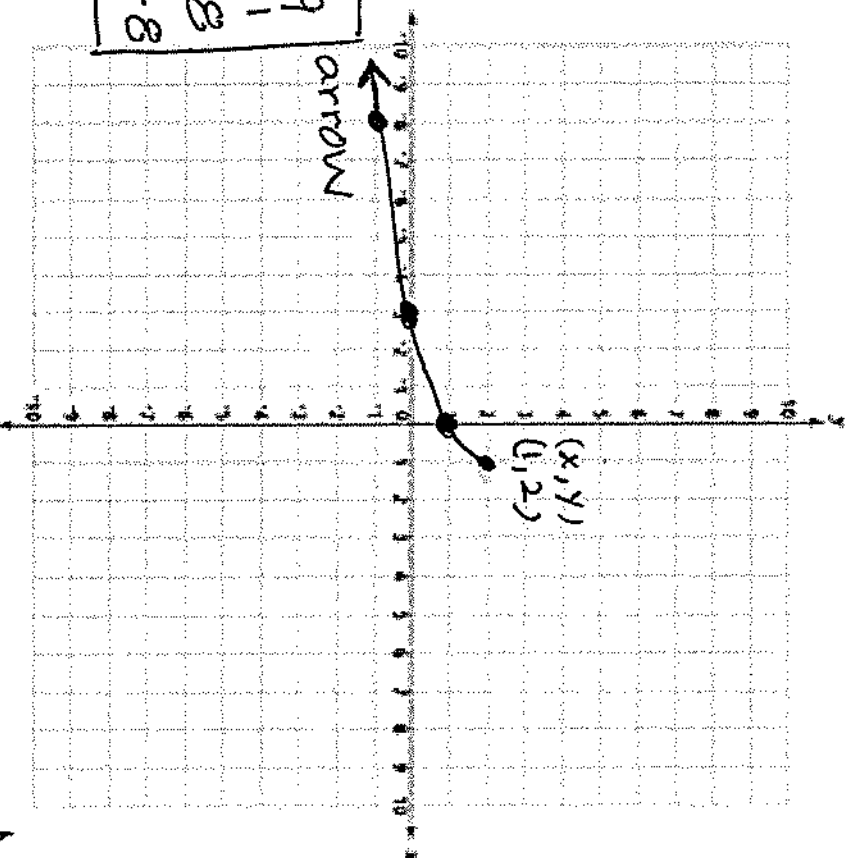
set radicand = 0, 1, 4, 9 perfect squares

d) $y = 2 - \sqrt{1-x}$

X	Y
1	2
0	1
-3	0
-8	-1

$1-x = 0$
$-x = -1$
$x = 1$
$1-x = 1$
$-1-x = -1$
$-x = 0$
$x = 0$
$1-x = 4$
$-1-x = -1$
$-x = 3$
$x = -3$

$1-x = 9$
$-1-x = -1$
$-x = 8$
$x = -8$



Domain:	Range:
$(-\infty, 1]$	$(-\infty, 2]$

NOT

~~$[2, \infty)$~~
Wrong order

NOT

~~$[1, \infty)$~~
Wrong order

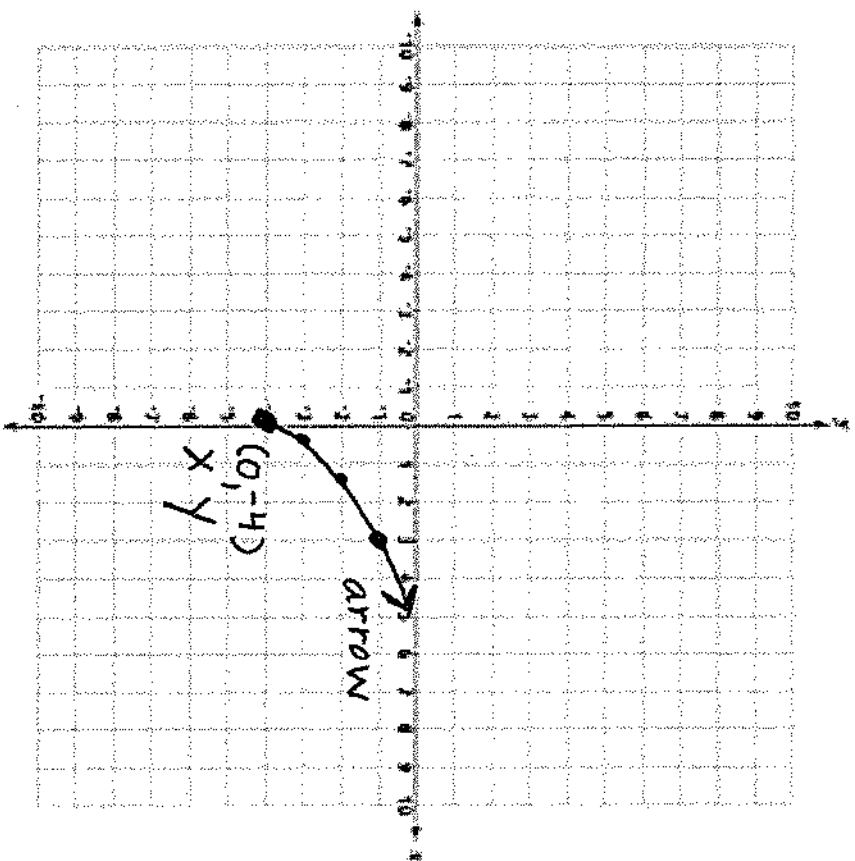
ex: Sketch and state the domain and range in interval notation.

e) $y = \sqrt{3x - 4}$

Set radicand = 0, 1, 4, 9 perfect squares
 $3x =$

X	Y
0	-4
$\frac{1}{3}$	-3
$\frac{4}{3}$	-2
3	-1

$3x = 0$ $x = 0$	$3x = 1$ $x = \frac{1}{3}$
$3x = 4$ $x = \frac{4}{3}$	$3x = 9$ $x = 3$



Domain:	Range:
$[0, \infty)$	$[-4, \infty)$

Cube Root Graphs

"LOF"

Parent Function: $f(x) = \sqrt[3]{x}$

Perfect
Cubes

$$\sqrt[3]{-8} = -2$$

$$\sqrt[3]{-1} = -1$$

$$\sqrt[3]{0} = 0$$

$$\sqrt[3]{1} = 1$$

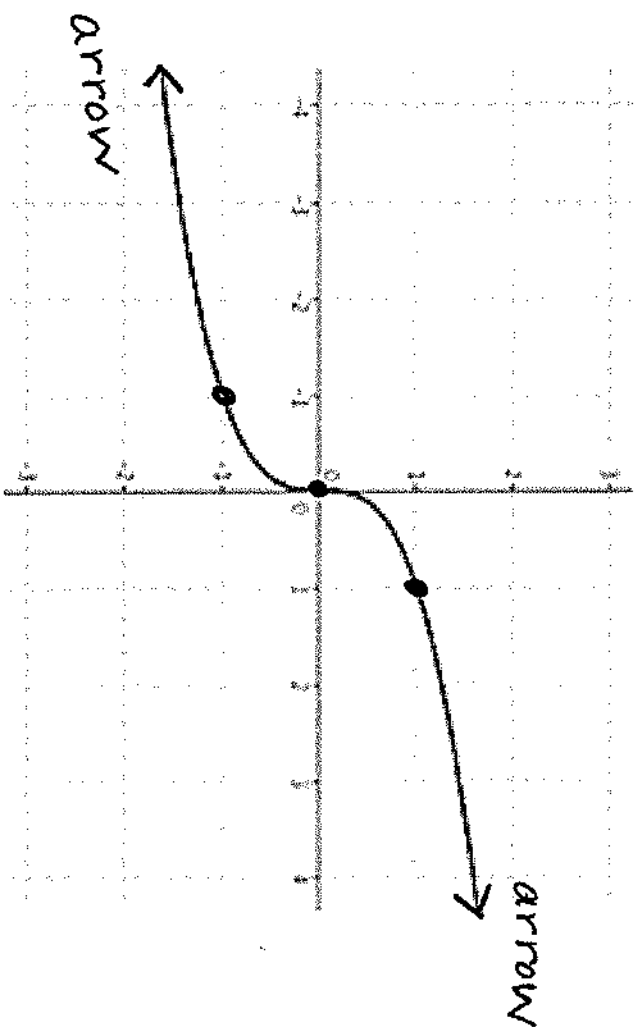
$$\sqrt[3]{8} = 2$$

Graph:

use perfect cubes →

X	Y
-8	-2
-1	-1
0	0
1	1
8	2

* →



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

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

* Always this for cube root functions

ex: Sketch and state the domain and range in interval notation.

a) $y = \sqrt[3]{x-4} + 5$

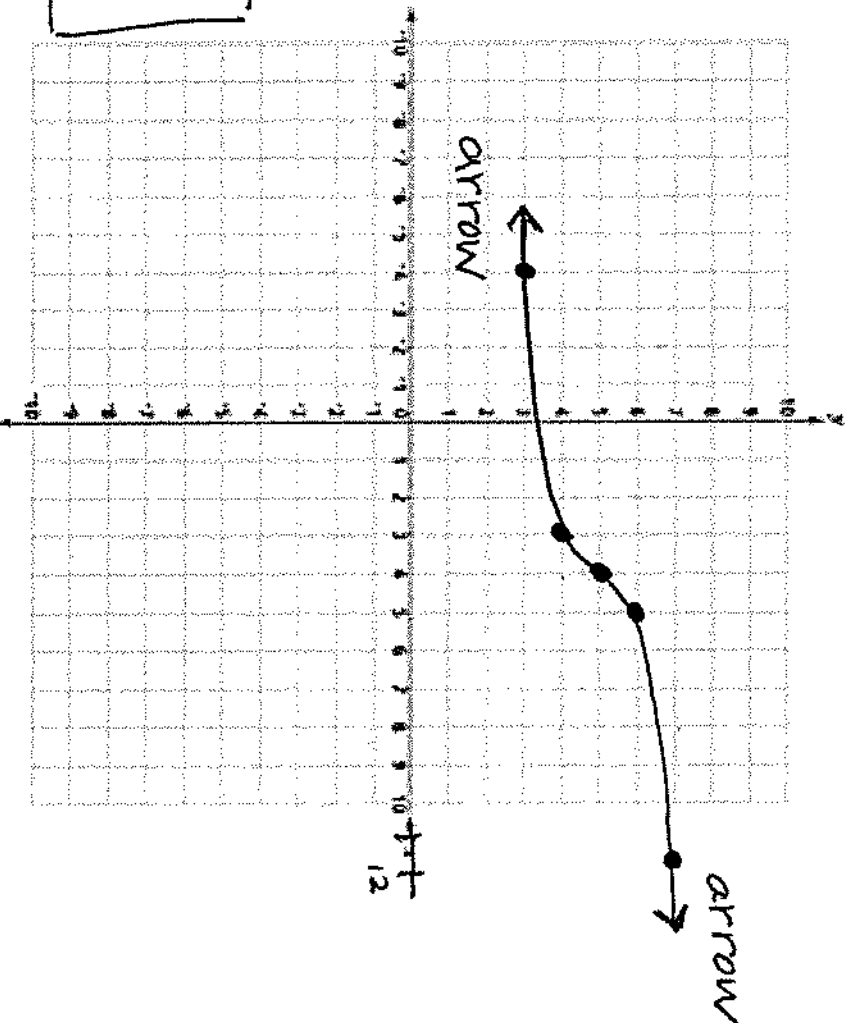
cube root

Set radicand = -8, -1, 0, 1, 8 perfect cubes

$x-4 =$

X	Y
-4	3
3	4
4	5
5	6
12	7

$x-4 = -8$ $+4$ $+4$ $x = -4$	$x-4 = 8$ $+4$ $+4$ $x = 12$
$x-4 = -1$ $+4$ $+4$ $x = 3$	
$x-4 = 0$ $x = 4$	
$x-4 = 1$ $+4$ $+4$ $x = 5$	



Domain: $(-\infty, \infty)$	Range: $(-\infty, \infty)$
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ex: Sketch and state the domain and range in interval notation.

b) $y = \sqrt[3]{x+3} - 4$

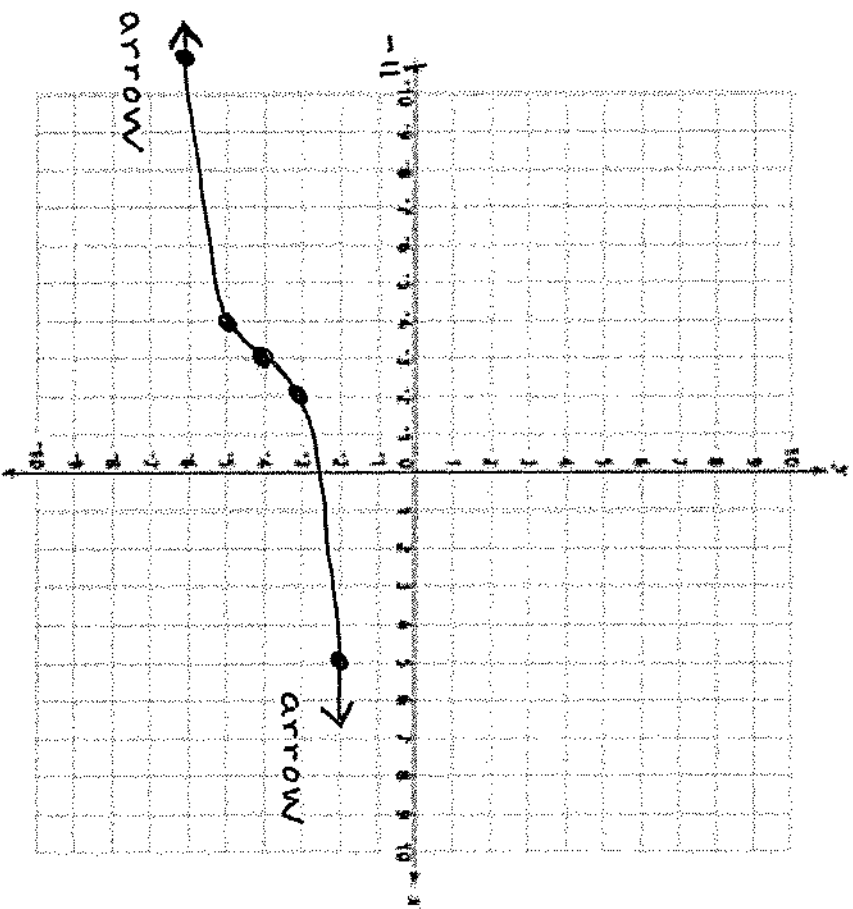
cube root

Set radicand = -8, -1, 0, 1, 8 perfect cubes

$x+3 =$

X	Y
-11	-6
-4	-5
-3	-4
-2	-3
5	-2

$x+3 = -8$ -3 $x = -11$	$x+3 = -1$ -3 $x = -4$	$x+3 = 0$ $x = -3$	$x+3 = 1$ -3 $x = -2$	$x+3 = 8$ -3 $x = 5$
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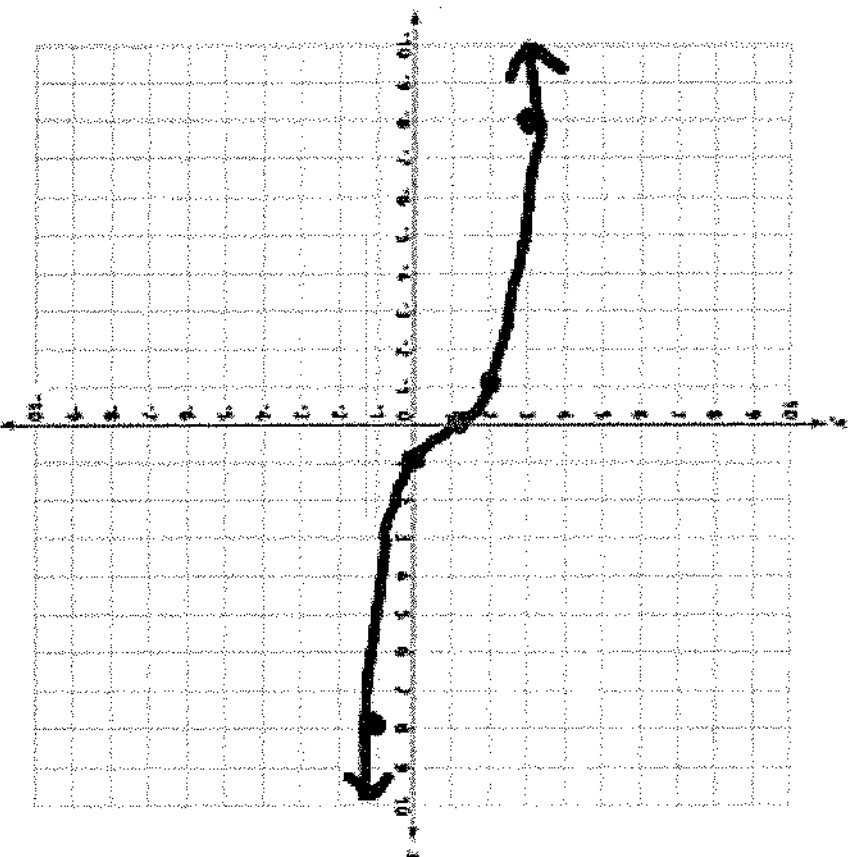


Domain: $(-\infty, \infty)$	Range: $(-\infty, \infty)$
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ex: Sketch and state the domain and range in interval notation.

c) $y = -\sqrt[3]{x} + 1$

x	y
-8	3
-1	2
0	1
1	0
8	-1



Domain:

$(-\infty, \infty)$

Range:

$(-\infty, \infty)$

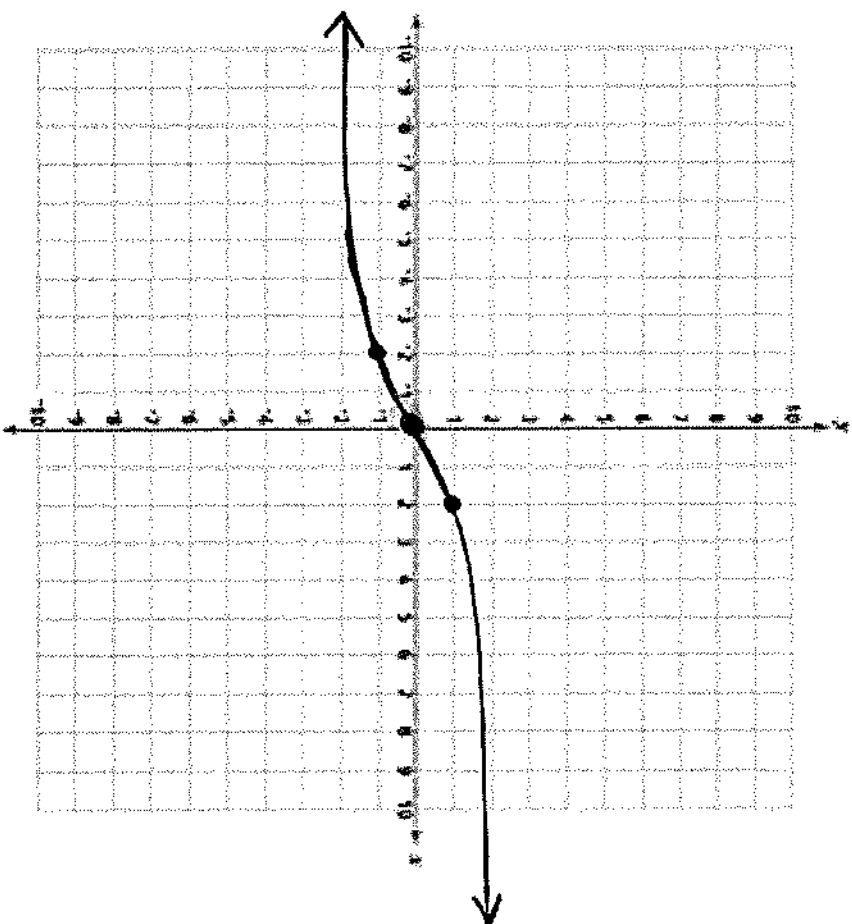
ex: Sketch and state the domain and range in interval notation.

Set radicand = $-8, -1, 0, 1, 8$ perfect cubes

$$d) y = \sqrt[3]{\frac{x}{2}}$$

X	Y
-16	-2
-2	-1
0	0
2	1
16	2

$\cancel{2} \cdot \frac{X}{\cancel{2}} = -8 \cdot 2$ $X = -16$	$\cancel{2} \cdot \frac{X}{\cancel{2}} = 1 \cdot 2$ $X = 2$
$\cancel{2} \cdot \frac{X}{\cancel{2}} = -1 \cdot 2$ $X = -2$	$\cancel{2} \cdot \frac{X}{\cancel{2}} = 8 \cdot 2$ $X = 16$
$\cancel{2} \cdot \frac{X}{\cancel{2}} = 0 \cdot 2$ $X = 0$	



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