2.6 Graphs of Basic functions

The Identity, Squaring, and Cubing Functions
The Square Root and Cube Root Functions
The Absolute Function
Piecewise-Defined Functions

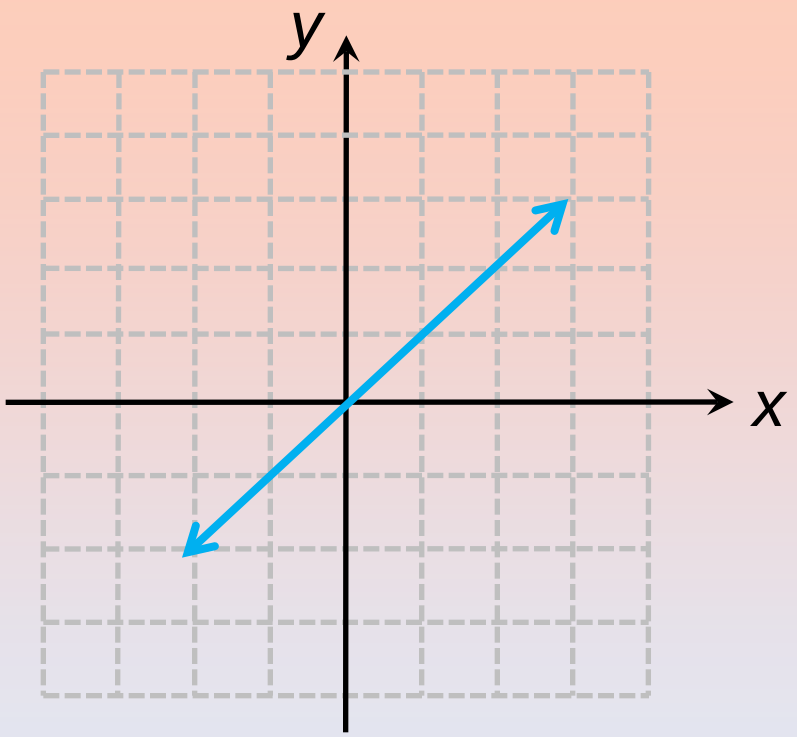
PEARSON Education

IDENTITY FUNCTION $f(x) = x$

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

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

x	y
-2	-2
-1	-1
0	0
1	1
2	2



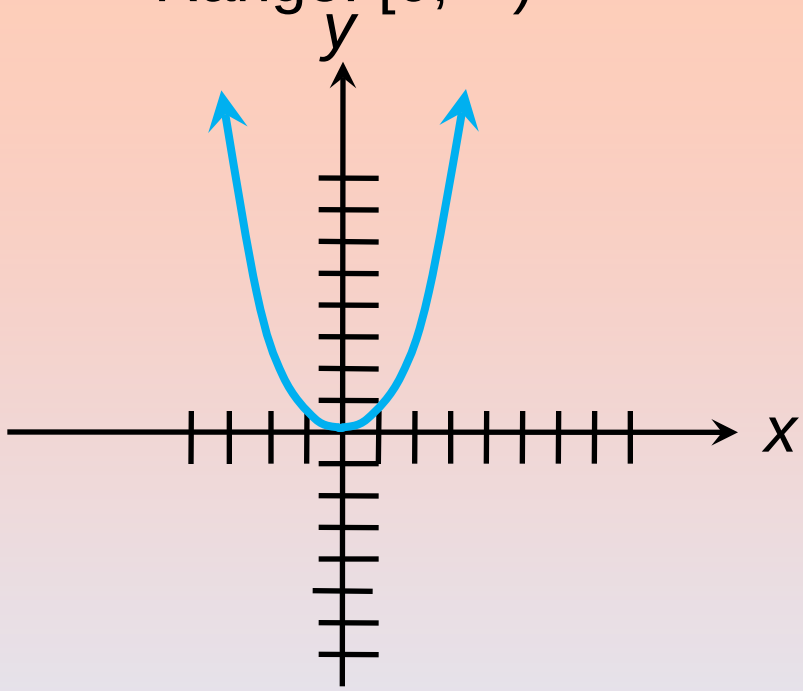
$f(x) = x$ is increasing on its entire domain, $(-\infty, \infty)$.
It is continuous on its entire domain.

SQUARING FUNCTION $f(x) = x^2$

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

Range: $[0, \infty)$

x	y
-2	4
-1	1
0	0
1	1
2	4



$f(x) = x^2$ decreases on the interval $(-\infty, 0]$ and increases on the interval $[0, \infty)$.

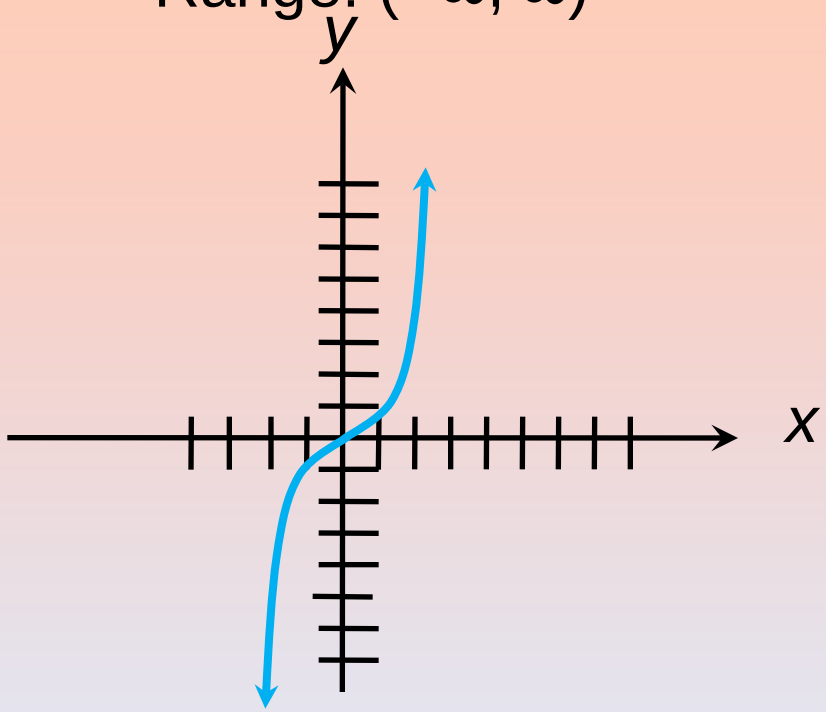
It is continuous on its entire domain, $(-\infty, \infty)$.

CUBING FUNCTION $f(x) = x^3$

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

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

x	y
−2	−8
−1	−1
0	0
1	1
2	8



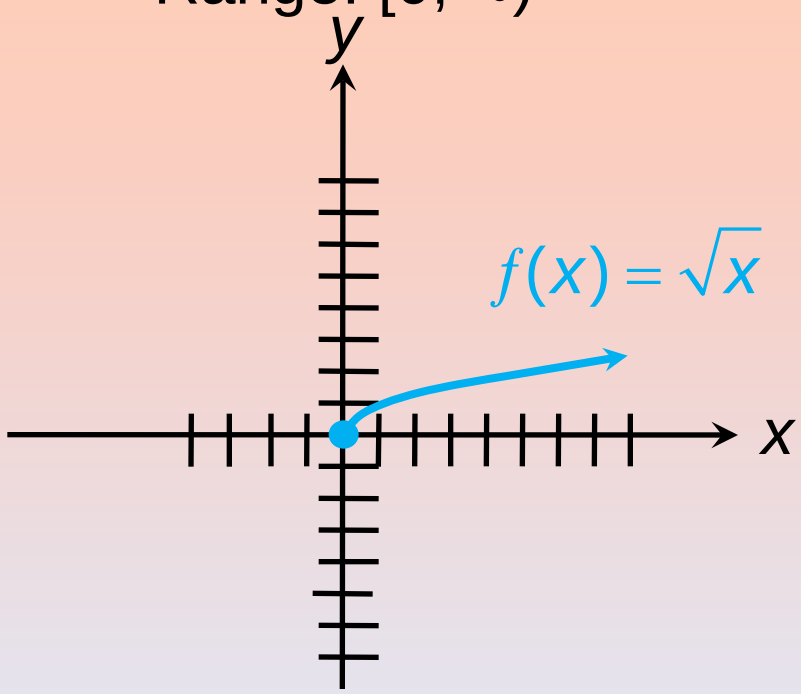
$f(x) = x^3$ increases on its entire domain, $(-\infty,\infty)$.
It is continuous on its entire domain, $(-\infty, \infty)$.

SQUARE ROOT FUNCTION $f(x) = \sqrt{x}$

Domain: $[0, \infty)$

Range: $[0, \infty)$

x	y
0	0
1	1
4	2
9	3
16	4



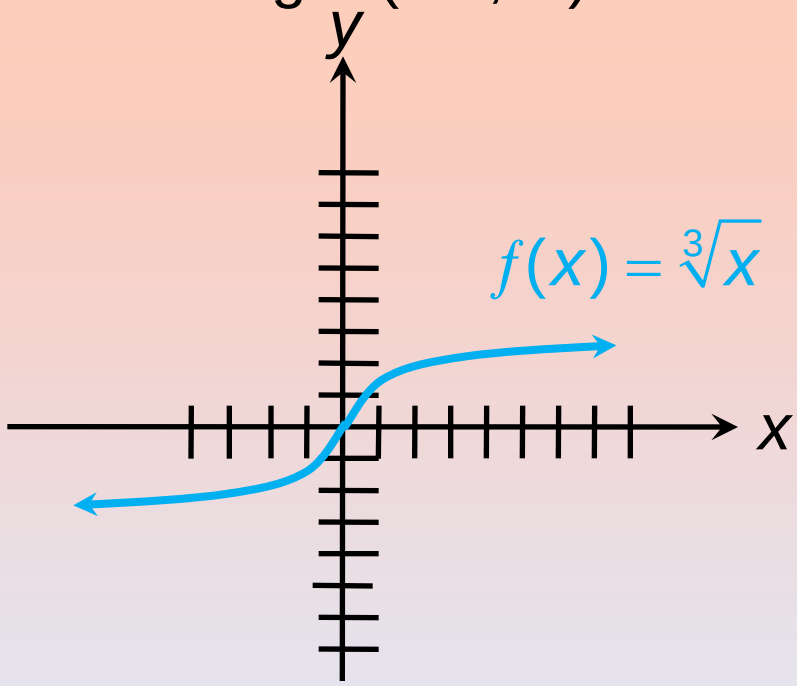
$f(x) = \sqrt{x}$ increases on its entire domain, $[0,\infty)$.
It is continuous on its entire domain, $[0, \infty)$.

CUBE ROOT FUNCTION $f(x) = \sqrt[3]{x}$

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

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

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



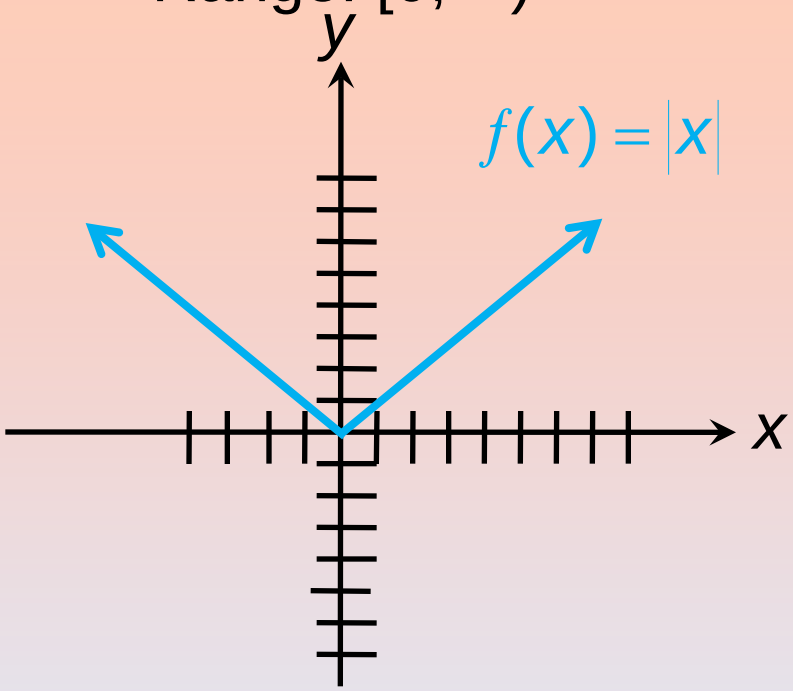
$f(x) = \sqrt[3]{x}$ increases on its entire domain, $(-\infty, \infty)$.
It is continuous on its entire domain, $(-\infty, \infty)$.

ABSOLUTE VALUE FUNCTION $f(x) = |x|$

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

Range: $[0, \infty)$

x	y
-2	2
-1	1
0	0
1	1
2	2



$f(x) = |x|$ decreases on the interval $(-\infty, 0]$ and increases on $[0, \infty)$.

It is continuous on its entire domain, $(-\infty, \infty)$.

Example 2

GRAPHING PIECEWISE-DEFINED FUNCTIONS

Graph the function.

a. $$f(x) = \begin{cases} -2x + 5 & \text{if } x \le 2 \\ x + 1 & \text{if } x > 2 \end{cases}$$

b. $$f(x) = \begin{cases} 2x + 3 & \text{if } x \le 1 \\ -x + 6 & \text{if } x > 1 \end{cases}$$

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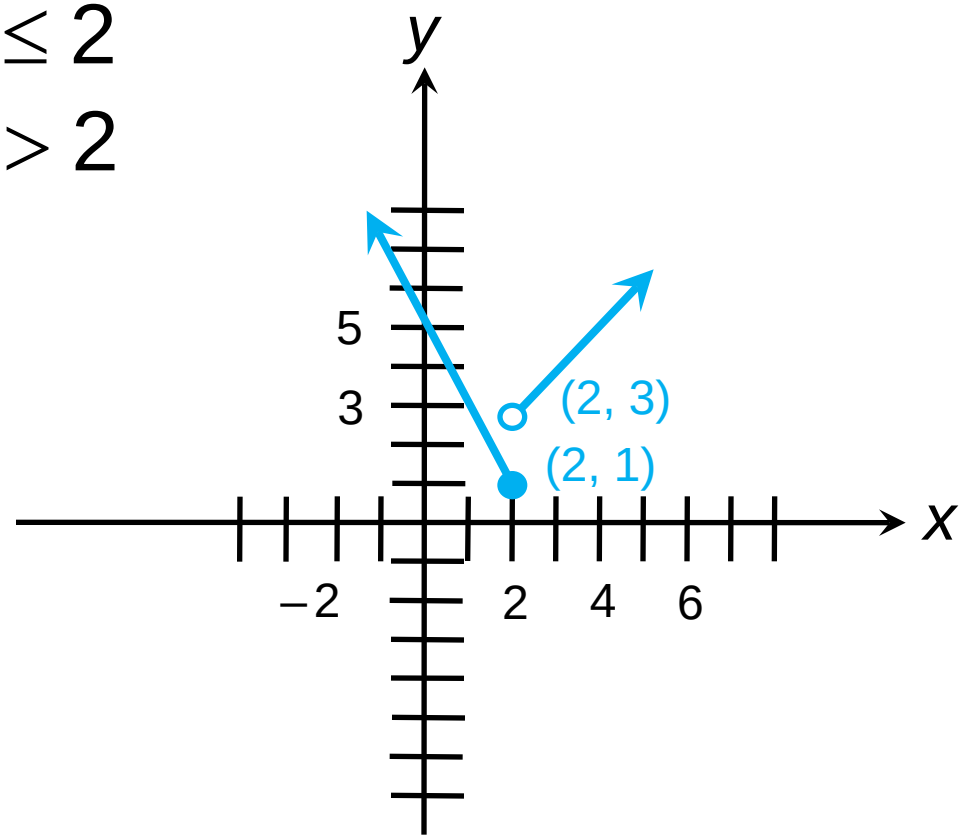
GRAPHING PIECEWISE-DEFINED FUNCTIONS

Graph the function.

a. $$f(x) = \begin{cases} -2x + 5 & \text{if } x \le 2 \\ x + 1 & \text{if } x > 2 \end{cases}$$

Solution



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GRAPHING PIECEWISE-DEFINED FUNCTIONS

Graph the function.

b.

$$f(x) = \begin{cases} 2x + 3 & \text{if } x \le 1 \\ -x + 6 & \text{if } x > 1 \end{cases}$$

Solution