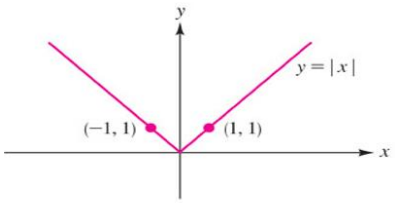
3.2
Notes

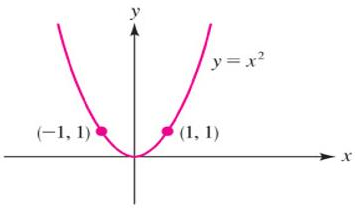
GRAPHS OF FUNCTIONS

OBJECTIVES: 1) Graph functions and piecewise functions.
2) Memorize the six basic functions and their graphs.

THE SIX BASIC GRAPHS:



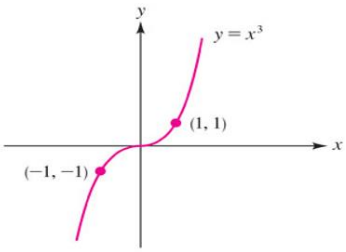
(a) The absolute value function
$y = |x|$
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$



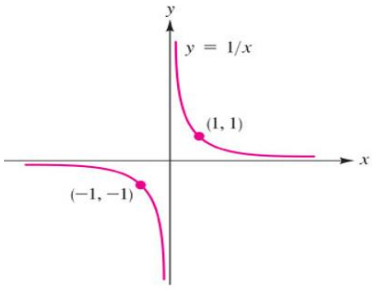
(b) The squaring function
$y = x^2$
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$

MEMORIZE:

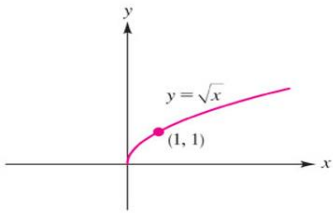
1) Name
2) Equations
3) At least two points
4) Domain
5) Range



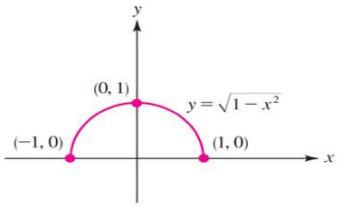
(c) The cubing function
$y = x^3$
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$



(d) The reciprocal function
$y = 1/x$
Domain: $(-\infty, 0) \cup (0, \infty)$
Range: $(-\infty, 0) \cup (0, \infty)$

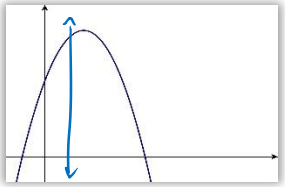


(e) The square root function
$y = \sqrt{x}$
Domain: $[0, \infty)$
Range: $[0, \infty)$

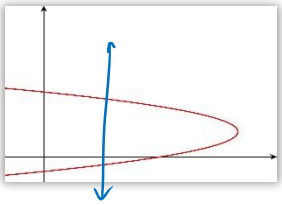


(f) The semicircle function
$y = \sqrt{1 - x^2}$
Domain: $[-1, 1]$
Range: $[0, 1]$

VERTICAL LINE TEST

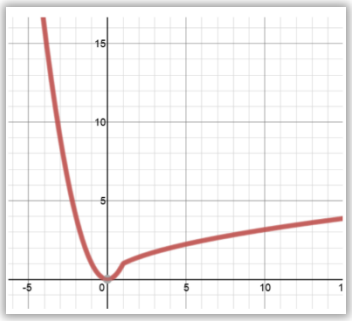


Function

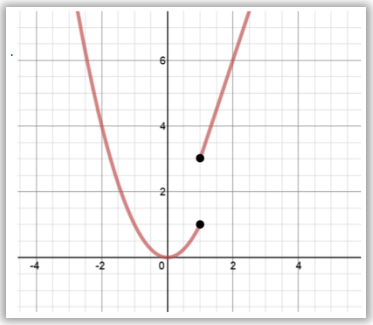


not a function

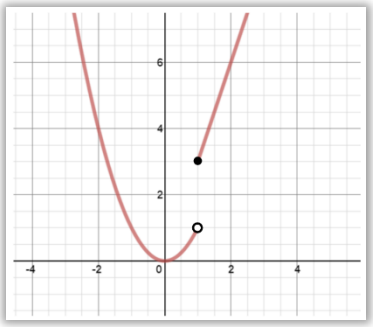
FUNCTION OR NOT?



Function

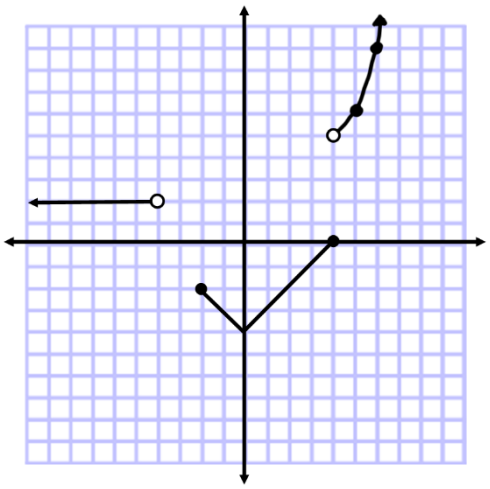


not a function



function

PIECEWISE FUNCTIONS



Find: f(1) $f(1) = -3$

f(4) $f(4) = 0$

x when f(x) is -2 $x = -2, 2$

Domain: $(-\infty, -4) \cup [-2, \infty)$

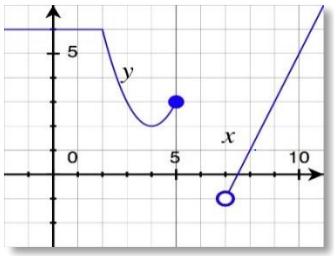
Range: $[-4, -2] \cup \{23 \cup (5, \infty)$

Define the function: If $x < -4$, $f(x) = 2$

If $-2 \le x \le 4$, $f(x) = |x| - 4$

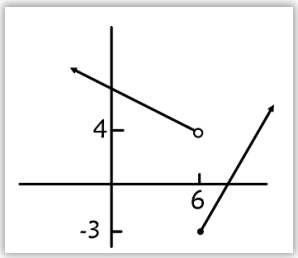
If $x > 4$, $f(x) = (x-4)^2 + 5$

Find the domain and range of each function:



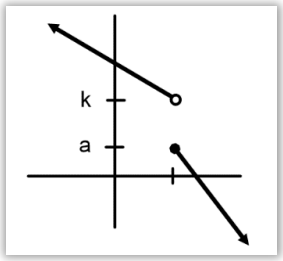
D: $(-\infty, 0] \cup (7, \infty)$

R: $(-1, \infty)$



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

R: $[-3, \infty)$



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

R: $(-\infty, a] \cup (k, \infty)$

Graph the piecewise function and find the range.

$$f(x) = \begin{cases} -x^3 & \text{if } -2 \le x < 2 \\ |x| & \text{if } x \ge 2 \end{cases}$$

R: $(-8, \infty)$

$f(-2) = -(-2)^3 = 8$

$f(0) = -(0)^3 = 0$

$f(2) = -(2)^3 = -8$ ← open circle

$f(2) = |2| = 2$

$f(3) = |3| = 3$