

2.3 Functions and Relations

❖ Functions

Relation – A set of ordered pairs.

Domain: The set of all input values (*x-values*) for a relation.

Range: The set of all output values (*y-values*) for a relation.

The domain (first components) and

The range (second components)

Ex. Determine the domain and the range of the relation

$$\{(1, 2), (2, 3), (3, 3), (4, 5)\}.$$

Domain:

Range:

Function – A relation where each element of the domain corresponds to *exactly one* element of the range.

❖ Function Notation

$y = f(x)$ means that y is a function of x .

$f(x)$ reads “ f of x ,” “ f at x ,” or “the value of f at x .”

The function $f(x) = x^2 + 2x - 6$ is the same as the equation $y = x^2 + 2x - 6$.

Ex. Find the following function values for the function $f(x) = x^2 + 2x - 6$:

a) $f(0) =$

b) $f(-3) =$

c) $f(2b) =$

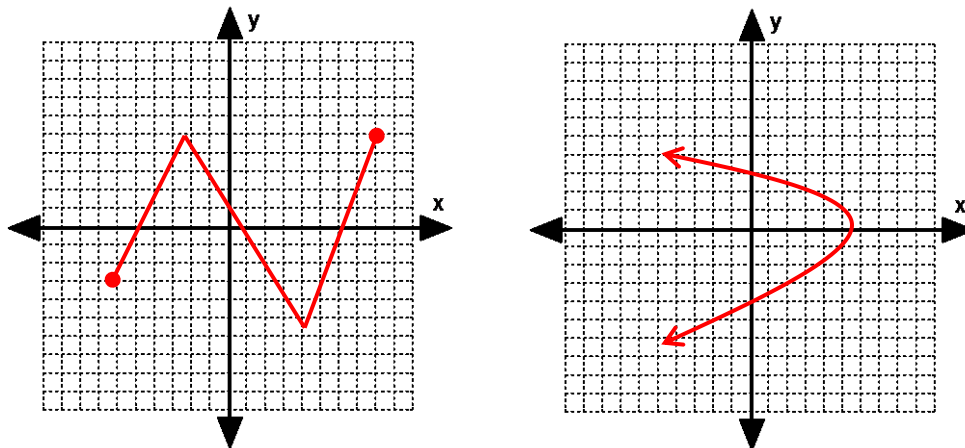
d) $f(x+h) =$

❖ Graphs of Functions

To determine whether a relation is a function from its graph, perform a vertical line test.

The Vertical Line Test for Functions

If any vertical line intersects a graph in **more than one point**, the graph is **not** the graph of a function.



Obtaining Information from the graph of a function:

- A closed dot/circle indicates that the graph does not extend beyond this point and that the point belongs to the graph.

Interval Notation: $[\quad , \quad]$

- An open dot/circle indicates that the graph does not extend beyond this point and that the point does not belong to the graph.

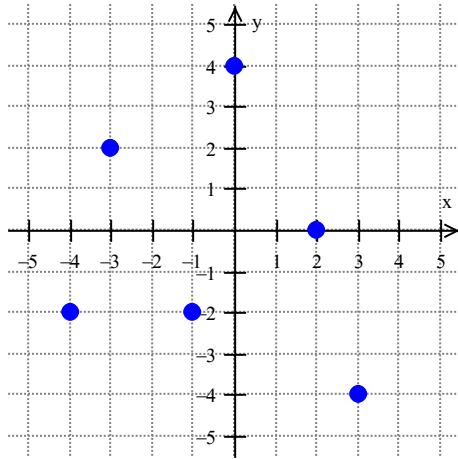
Interval Notation: (\quad , \quad)

- An arrow indicates that the graph extends indefinitely in the direction of the arrow.

Interval Notation: $(-\infty, \infty)$

Ex. Determine the domain and range of the function.

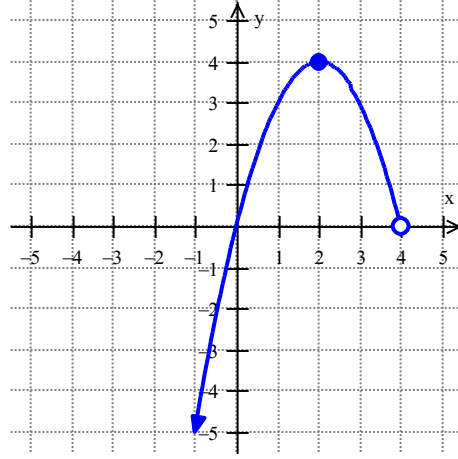
(a)



Domain: _____

Range: _____

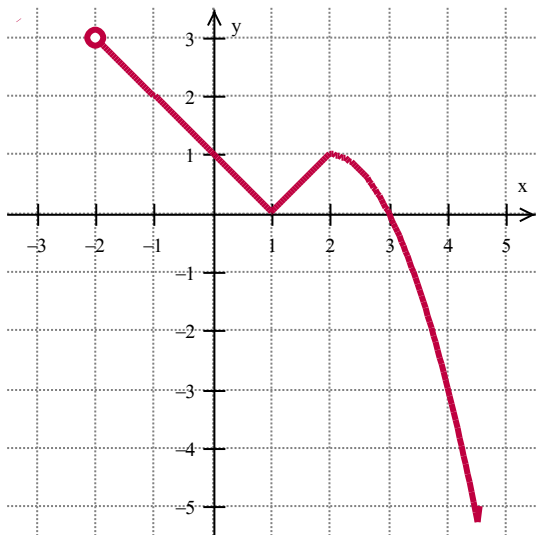
(b)



Domain: _____

Range: _____

Ex. Use the graph of f to solve the following:



(a) Find $f(4) =$

(b) For what value(s) of x is $f(x) = 1$?

(c) State the x -intercept(s).

(d) State the y -intercept(s).

(e) State the domain using interval notation.

(f) State the range using interval notation.