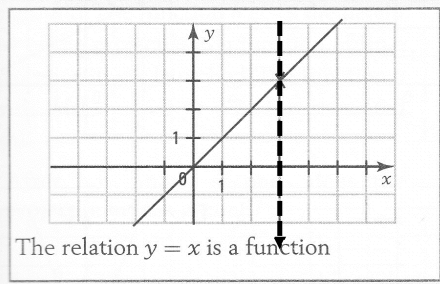# Functions
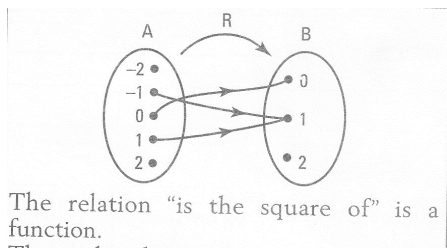
A **function** is a relation where there is **only one y-value for each x-value**.

<div style="display:flex">

Functions

The relation "is the square of" is a function.

The relation $y = x$ is a function

The relation whose set of ordered pairs is:

$\{(0, 1), (1, 1), (2, 8), (3, 27)\}$ is a function.

Not Functions

The relation "is a divisor of" is not a function.

The relation $x = y^2$ is not a function.

The relation whose set of ordered pairs is:

$\{(0, 0), (1, -1), (1, 1 \}$ is not a function

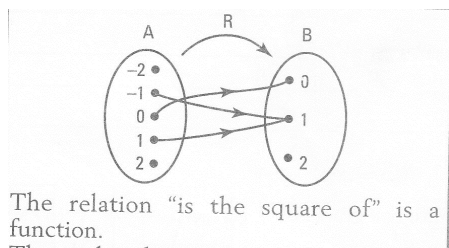</div>

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Properties of Functions
1)   DOMAIN and RANGE

Domain: All possible **X-VALUES** of the function

Range: All possible **Y-VALUES** of the function

Examples:

The relation "is the square of" is a function.

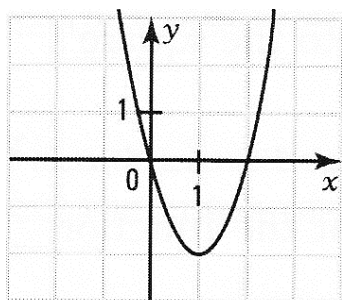dom f: _____

ran f: _____

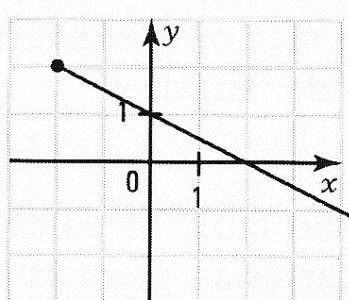$\{(0, 1), (1, 1), (2, 8), (3, 27)\}$ is a function.
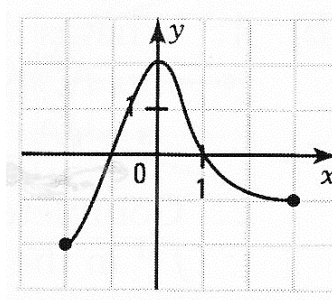
dom f: _____

ran f: _____
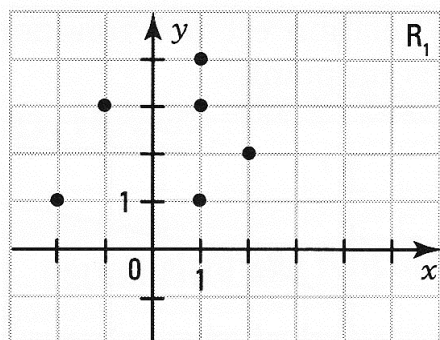

dom f: _____

ran f: _____

dom f: _____

ran f: _____
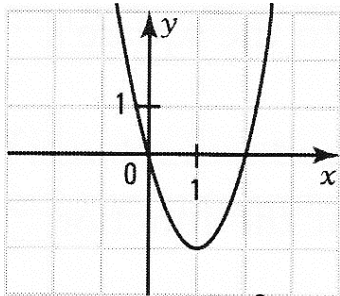

dom f: _____

ran f: _____

dom f: _____

ran f: _____

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2)   ZERO and INITIAL VALUE

<u>**Zero**</u>: Value of x(s) when y=0   **(X, 0)**
(x-intercept)

<u>**Initial Value**</u>: Value of y (s) when x=0   **(0, Y)**
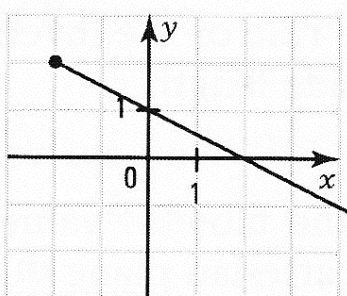**(y-intercept)**

$f(x) = 2(x - 1)^2 - 2$

Zero (X,0):

Initial Value (0,Y):

$f(x) = - 0.5 x + 1$

Zero (X,0):

Initial Value (0,Y):

Zero (X,0):

Initial Value (0,Y):

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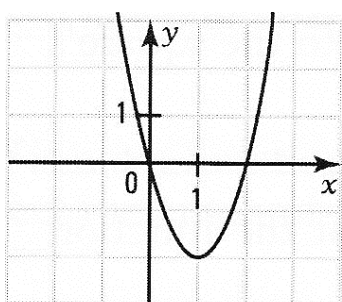
3)   <u>SIGN of a Function</u> (Positive & Negative)

Studying the <u>**SIGN**</u> of a function means <u>**FINDING THE VALUES of X**</u> for which the function is:
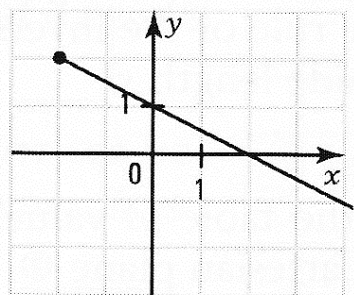
- <u>**POSITIVE**</u> (*When Y is greater or equal to 0*)

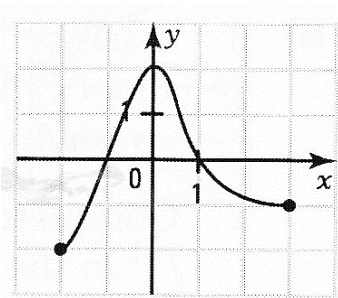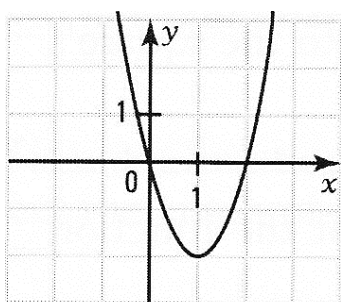- <u>**NEGATIVE**</u> (*When Y is less or equal to 0*)

EXAMPLES:

+ :

- :

+ :

- :

+ :

- :

4)   <u>**Variation of a Function**</u>
(Increasing & Decreasing)

EXAMPLES:

| : |

| : |

| : |

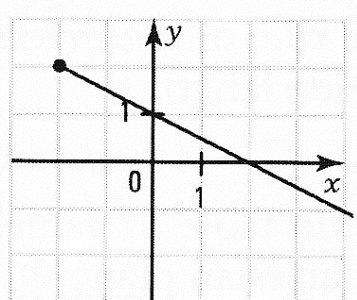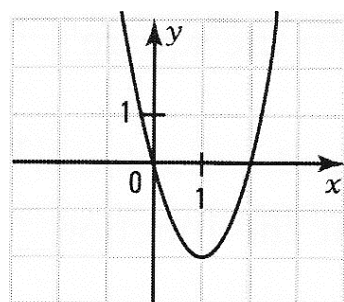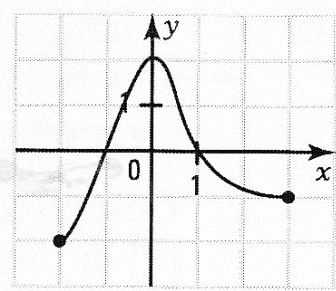| : |

5)   <u>Extrema</u>
(Maximum & Minimum)

EXAMPLES:

Max:

Min:

Max:

Min:

Max:

Min:

Nov 4-2:09 PM