Objective: Identify Key Features of a Quadratic Function.

Concept

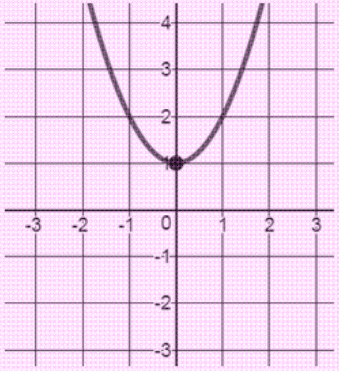
Domain: **the set of all values of x** that can be used in a function (the **input values**)

- The domain of a quadratic function is the set of all real numbers because any real number can be used for x.

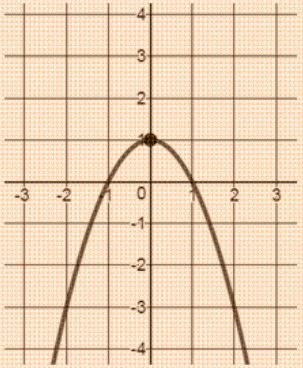
Range: **the set of all values of y** $(or\ f(x))$, that are the **output values** of the function for the values of the domain.

- If the vertex of a quadratic function is a minimum, the range is the values of $y \geq$ the y value of the vertex
- If the vertex of a quadratic function is a maximum, the range is the values of $y \leq$ the y value of the vertex

Range: $\{y|y \geq 1\}$



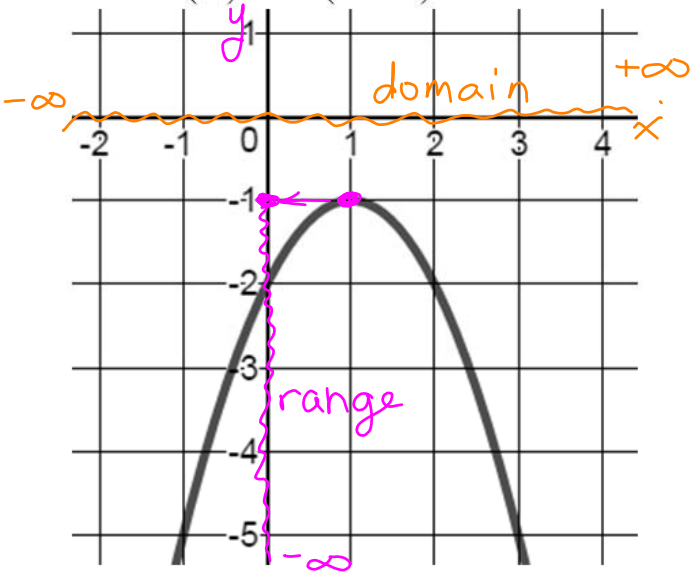
Range: $\{y|y \leq 1\}$



Objective: Identify Key Features of a Quadratic Function.

Ex) Determine the domain and range for each quadratic function. Write as an inequality and as an interval.

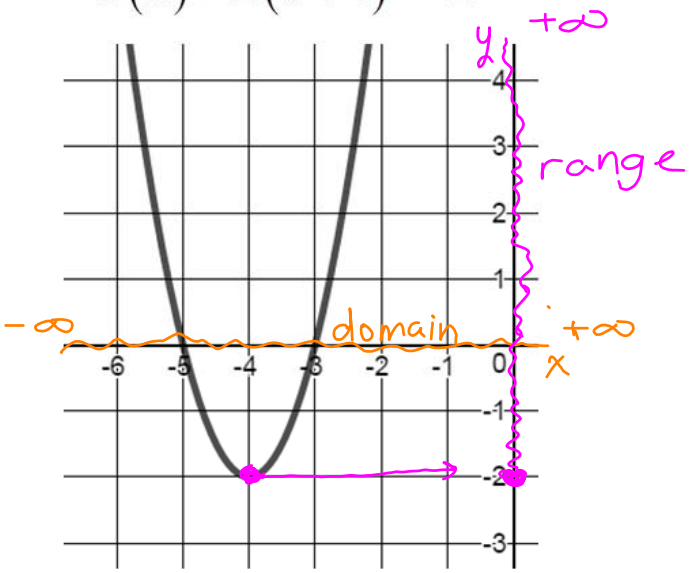
$h(x) = -(x-1)^2 - 1$



Domain: $-\infty < x < +\infty$ / $(-\infty, +\infty)$
(inequality) (interval)

Range: $y \leq -1$ / $(-\infty, -1]$
(inequality) (interval)

$k(x) = 2(x+4)^2 - 2$



Domain: $-\infty < x < +\infty$ / $(-\infty, +\infty)$
(inequality) (interval)

Range: $y \geq -2$ / $[-2, +\infty)$
(inequality) (interval)

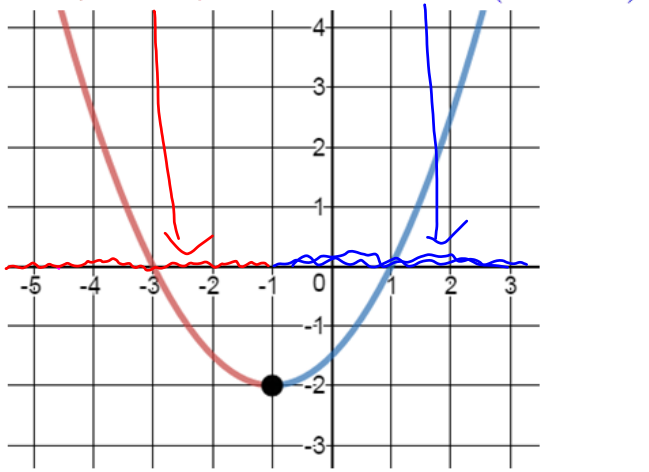
Objective: Identify Key Features of a Quadratic Function.

Note: Increasing and decreasing intervals are always determined by reading the graph of the function from left to right.

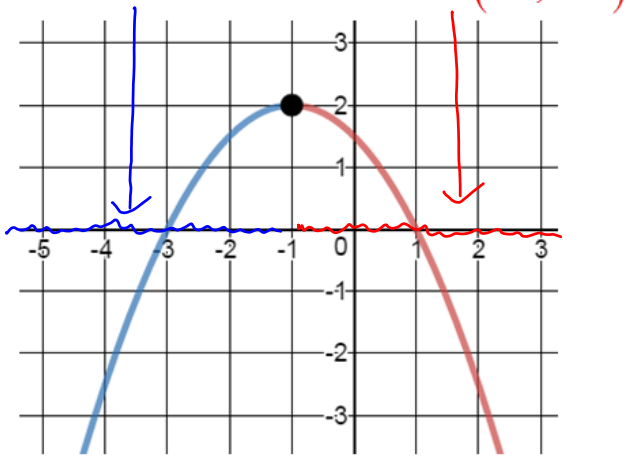
Increasing interval: the set of all values of x for which the values of the function, $f(x)$, are getting larger (increasing)

decreasing interval: the set of all values of x for which the values of the function, $f(x)$, are getting smaller (decreasing)

decreasing: $x < -1$ $(-\infty, -1)$ increasing: $x > -1$ $(-1, +\infty)$



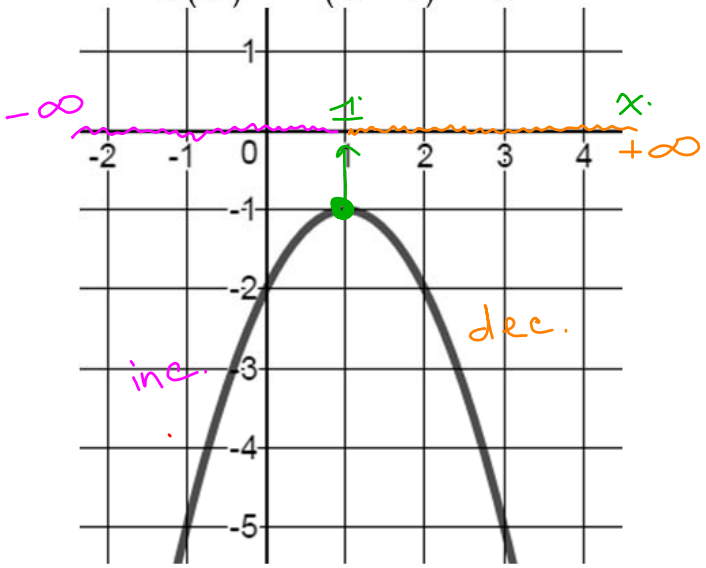
increasing: $x < -1$ $(-\infty, -1)$ decreasing: $x > -1$ $(-1, +\infty)$



Objective: Identify Key Features of a Quadratic Function.

Ex) Determine where each quadratic function is increasing and decreasing.

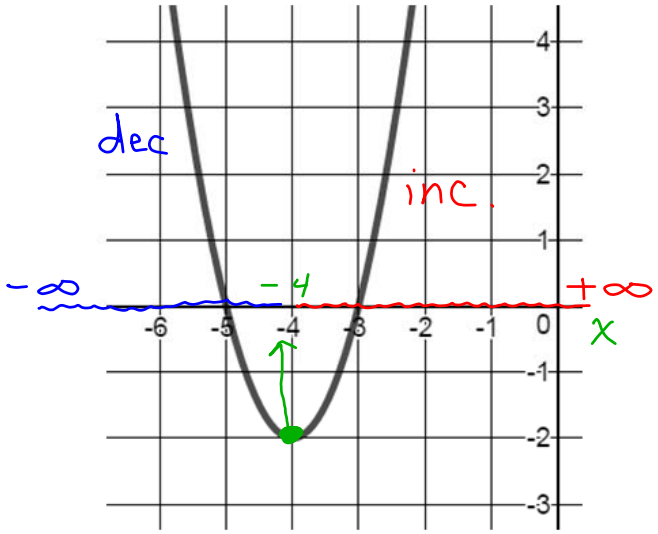
$h(x) = -(x-1)^2 - 1$



Increasing: $x < 1$ / $(-\infty, 1)$
(inequality) (interval)

Decreasing: $x > 1$ / $(1, +\infty)$
(inequality) (interval)

$k(x) = 2(x+4)^2 - 2$



Increasing: $x > -4$ / $(-4, +\infty)$
(inequality) (interval)

Decreasing: $x < -4$ / $(-\infty, -4)$
(inequality) (interval)

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Closure

At what value of *x* does a quadratic function change from increasing to decreasing or from decreasing to increasing?

A quadratic function changes from increasing to decreasing or from decreasing to increasing at the value of x that is the x-coordinate of the vertex.