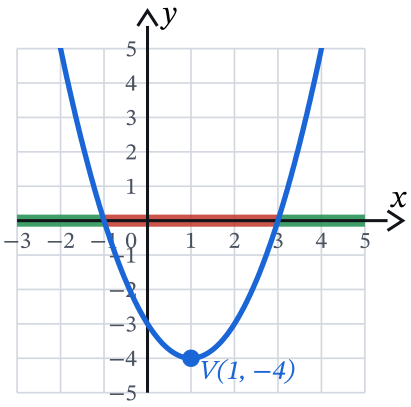
Name _____ Date _____

Behaviour and Sign of a Function

Example



$f(x) = x^2 - 2x - 3 = (x-1)^2 - 4$

Decreases for $x < 1$, increases for $x > 1$. The smallest value is -4 (at $x = 1$).

$f(x) > 0$ for $x < -1$ or $x > 3$ (green), $f(x) < 0$ for $-1 < x < 3$ (red).

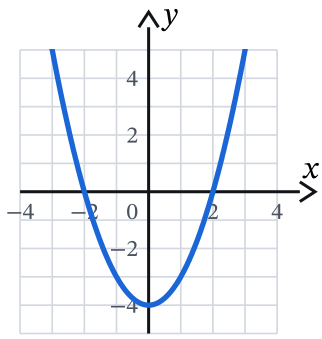
Remember

For $a > 0$ the function has its **smallest** value q at the vertex, and for $a < 0$ its **largest**.

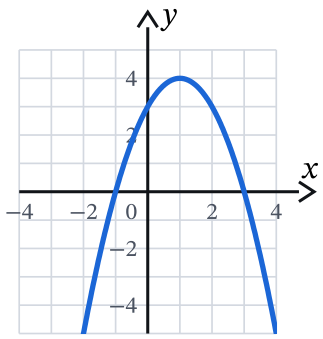
Between two zeros the sign is opposite to the sign of a, and outside them it is the same.

1 ON YOUR OWN Look at the graphs and complete the table.

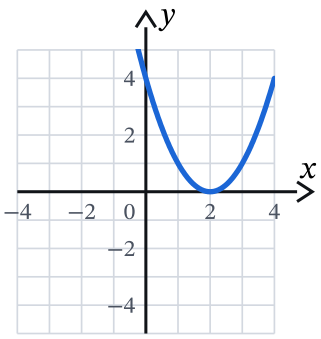
A



B



C



	Decreases for	Increases for	Smallest / largest value	$f(x) > 0$	$f(x) < 0$
A					
B					
C					

Names (pair) _____ Date _____

2 IN PAIRS **Colour the axis.** One student sketches the parabola, the other colours the x-axis (green $f(x) > 0$, red $f(x) < 0$) and writes the intervals. Swap roles.

$f(x) = -(x-1)(x-5)$



$f(x) > 0$: ☐

$f(x) < 0$: ☐

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



$f(x) > 0$: ☐

$f(x) < 0$: ☐

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



$f(x) > 0$: ☐

$f(x) < 0$: ☐

3 IN A GROUP **True or false?** For each statement find an example or a counterexample.

Every quadratic function has a smallest value. **true** / **false**

If $a < 0$, the function increases to the left of the vertex. **true** / **false**

The function $x^2 + 1$ is positive for every x. **true** / **false**

★ ON YOUR OWN **Exit card.** $f(x) = -(x-2)^2 + 9$: largest value ☐ at $x =$ ☐