

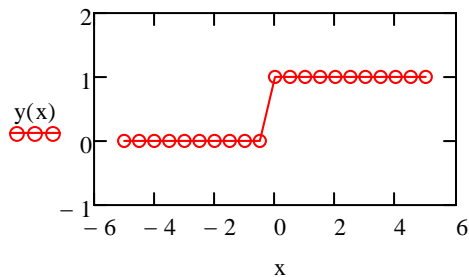
Boolean functions and If(, ,)

Important typing hint for if(, ,): First type if() then put the cursor between the parentheses and type two commas to create: if(, ,). Then fill in the spaces between the commas.

For any function of one or more variables, it is best to follow the function name with both parentheses at the outset. Unclosed parentheses are often a source of problems.

To create a step function, use an inequality: $y(x) := \text{if}(x < 0, 0, 1)$ $x := -5, -4.5 .. 5$

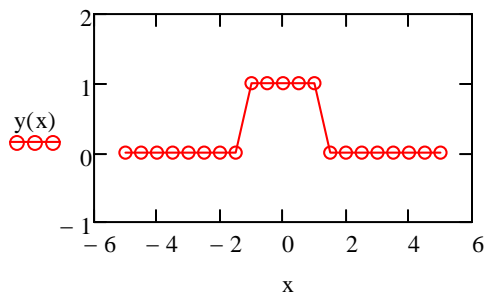
The value of the function is zero if $x < 0$, and is otherwise 1. Note that: $y(0) = 1$



Open and use the Boolean toolbar to enter the Boolean functions (and, or, xor, etc.) that are not on the keyboard.

To create a top hat function, use the OR function $y(x) := \text{if}(x < -1 \vee x > 1, 0, 1)$

If either the first inequality OR the second is true, the value selected is 0, otherwise it is 1.



Note that:

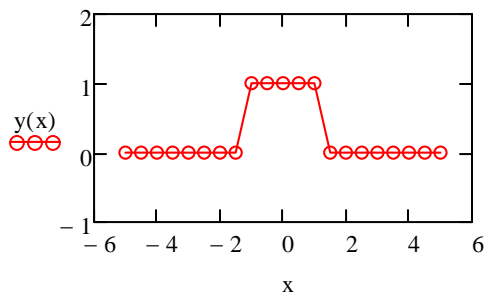
$$y(1) = 1$$

$$y(-1) = 1$$

Using the AND function:

$$y(x) := \text{if}(x \geq -1 \wedge x \leq 1, 1, 0)$$

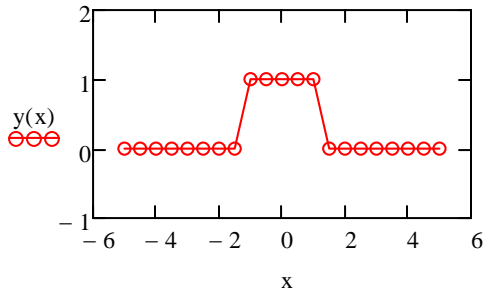
If the x value is to the left of +1 AND to the right of -1, then the value selected is 1, otherwise 0.



Using the XOR function:

$$y(x) := \text{if}(x \geq -1 \oplus x \leq 1, 0, 1)$$

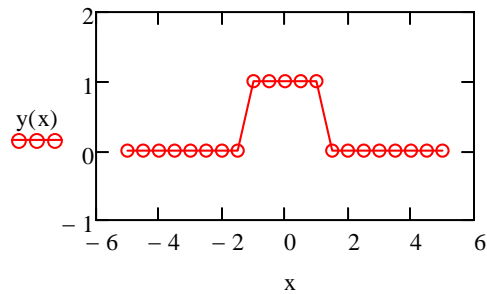
If either inequality is true, but not both, then the value selected is zero, otherwise the value is 1. This gives the same result as AND with the final arguments 0 and 1 having their order reversed.



Using the NOT function with the absolute value function:

$$y(x) := \text{if}[\neg(|x| > 1), 1, 0]$$

If the absolute value of x is NOT greater than one, the value selected is 1, otherwise it is zero.



In each example: $y(0) = 1$ $y(1) = 1$ $y(2) = 0$