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: \[ y(x) := \text{if}(x < 0, 0, 1) \quad x := -5, -4.5 \ldots 5 \]

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

\[ y(x) := \text{if}(x < -1 \lor x > 1, 0, 1) \]

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:

\[ y(x) := \text{if}(x \geq -1 \land x \leq 1, 0) \]

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.

![Graph](https://via.placeholder.com/150)

Using the NOT function with the absolute value function:

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

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

![Graph](https://via.placeholder.com/150)

In each example:

\[ y(0) = 1 \quad y(1) = 1 \quad y(2) = 0 \]