

## LOGICAL OPERATORS

Operator	Symbol	Meaning
AND	&&	short circuit AND
OR		short circuit OR
AND	&	Logic AND
OR		Logic OR
XOR	^	Exclusive OR
NOT	!	Negation

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In addition to the operators already mentioned, we will use logical operators so that, in combination with the control structures, we can create decisions that provide a solution to our needs.

In the table you can see the logical operators with which we will be working.

Unless we want to work with bits (ones and zeros), we will normally use the AND and OR operators in short circuit mode. In the following table we will explain what this means.

## TRUTH TABLE OF LOGICAL OPERATORS

X	Y	X&&Y	X Y	X^Y	!X
0	0	0	0	0	1
0	1	0	1	1	1
1	0	0	1	1	0
1	1	1	1	0	0

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In the figure we can see the application of the logical operators and the truth table that applies to each operator. This table must be known by heart since it is what we will be applying when we use the logical operators. The 1 means true and the 0 means false. However it is not difficult to memorize. The only thing we have to apply is the following.

In the case of the operator and (&&), the result will be true only if both values are true, otherwise the final result will be false.

In the case of the operator or (||), the result will be true if any of the operands (x or y) is true.

Above we mentioned the AND and short circuit OR operators. What it means is that if it is detected that the result no longer makes sense to evaluate it, for example if the operator && the evaluation of the operand on the left side is false, then the whole expression will be false and the remaining operand will no longer be evaluated. And in the case of the operator || if the operand on the left side then the result is true and therefore the other operand on the right side is no longer evaluated.

And in the case of the negation operator, the only thing it does is to invert the original value of the operand. So it will be very simple to apply this truth table for each of the operators if we apply the rules described. In the next exercises we will practice this kind of operators in combination with the control structures.

## RELATIONAL OPERATORS

Operator	Action
>	Greater than
>=	Greater or equal
<	Smaller than
<=	Less or equal
==	equals
!=	Different

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When using the decision structures, we will find the need to compare values. That is why we will use different types of operators for this.

Relational operators are listed on the sheet. And we will put them into practice in combination with the decision structures in the following exercises.

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