Missing Values with Logical Operators

This reading describes how the three logical *operators*—AND, OR, and NOT—work when one or both of their operands are NULL.

Many misunderstandings about NULLs in Boolean logic arise when you confuse NULL with false. So remember: NULL does *not* mean false; it means "unknown."

The examples below use this sample table, which is not available to query in the VM:

name	age	siblings
An	8	1
Belinda	NULL	3
Chand	3	NULL
Delmar	NULL	NULL
Enise	1	2

The AND Operator

For an AND expression to return true, the operands on both sides must be true. On the other hand, if either expression is false, then the expression returns false.

This means, if one operand is NULL and the other is true, then the AND expression returns NULL. If one operand is NULL and the other is false, then it returns false. If both operands are NULL, it returns NULL.

Expression	Value
true AND NULL	NULL
false AND NULL	false
NULL AND NULL	NULL

Look in the example table above for children that you know are under the age of two *and* have more than one sibling. Which can you say definitely *do* or *do not* match the criteria?

Here are the results:

name	age < 2	siblings > 1	age < 2 AND siblings > 1
An	false	false	false
Belinda	NULL	true	NULL

Chand	false	NULL	false
Delmar	NULL	NULL	NULL
Enise	true	true	true

The OR Operator

For an OR expression to return true, only one of the operands needs to be true. It is only false if both operands are false.

If one operand is NULL and the other is true, then the OR expression returns true. If one operand is NULL and the other is false, then it returns NULL. If both operands are NULL, it returns NULL.

Expression	Value
true OR NULL	true
false OR NULL	NULL
NULL OR NULL	NULL

For example, look in the table above for children who are under the age of two *or* have more than one sibling. Which can you say definitely *do* or *do not* match the criteria?

Here are the results:

name	age < 2	siblings > 1	age < 2 OR siblings > 1
An	false	false	false
Belinda	NULL	true	true
Chand	false	NULL	NULL
Delmar	NULL	NULL	NULL
Enise	true	true	true

The NOT Operator

When the unary operator NOT is applied to a NULL operand, the result remains NULL.

Expression	Value
NOT NULL	NULL

The expression NOT NULLin the table above does not represent the IS NOT NULL operator; it is simply the unary operator NOT applied to the literal Boolean value NULL.

Once again, look in the table, this time for children who are *not* under the age of two. Which can you say definitely *do* or *do not* match the criterion?

Here are the results:

name	age < 2	NOT age < 2
An	false	true
Belinda	NULL	NULL
Chand	false	true
Delmar	NULL	NULL
Enise	true	false

Try It!

For this table of data, what would be the result of each expression, for each row in the table? [Click here for the answers.](#)

title	year	length
If	1993	4:31
Security	1969	NULL
Coming Around Again	NULL	3:41
Seasons of Love	1996	2:52
Love So Soft	2017	2:52

1. year < 2000 AND length > 4:00

2. year < 2000 OR length > 4:00

3. NOT(year < 2000 OR length > 4:00)