

Now that we are familiar with the individual logic gates and their truth conditions we are in a position to create **logic circuits**. These are combinations of logic gates controlled by inputs that can provide a range of useful outputs.

Basic example

In the below circuit we have the following gates connected to two inputs with one output, moving through the following stages:

1. AND, NOT , NOT
2. AND, NOR

This is equivalent to the following truth table:

| A | B | Output | |
|---|---|--------|-----|
| - | - | ----- | |
| 0 | 0 | 0 | (1) |
| 1 | 0 | 1 | (2) |
| 0 | 1 | 1 | (3) |
| 1 | 1 | 0 | (4) |



Line 1 of the truth table





Line 2 and 3 of the truth table (equivalent to each other)

Line 4 of the truth table

Applied example

With this circuit we have a more interesting applied example.

It corresponds to an automatic sliding door and has the following states

- a proximity sensor that opens the doors when someone approached from outside
- a proximity sensor that opens the doors when someone approaches from the inside
- a manual override that locks both approaches (inside and out) meaning no one can enter or leave

Here's a visual representation: [logic_circuits_5.gif](#) The following truth table represents this behaviour, with A and B as the door states, C as the override and X as the door action (0 = open, 1 = closed)

| A | B | C | X |
|---|---|---|---|
| - | - | - | - |
| 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |



Automatic door sensor with manual override