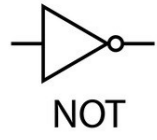


N5 Logic

NOT Gate

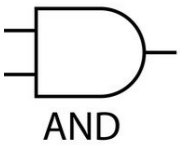


The output Z is the opposite of the input A. If the input is 0 (low) then the output will be 1 (high).

A	Z
0	1
1	0

Boolean expression
 $\bar{A} = Z$

AND Gate

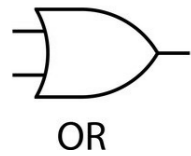


The output Z will only be high (1) when both input A and B are high (1).

A	B	Z
0	0	0
0	1	0
1	0	0
1	1	1

Boolean expression
 $A \cdot B = Z$

OR Gate

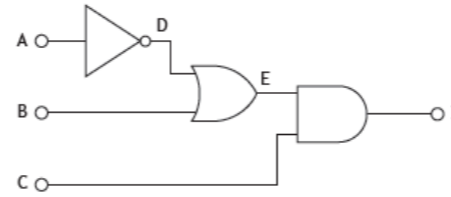


The output Z will be high (1) when either input A or B or both inputs are high (1).

A	B	Z
0	0	0
0	1	1
1	0	1
1	1	1

Boolean expression
 $A + B = Z$

Completing a truth table from a Logic circuit



(a) Complete the truth table for the logic diagram shown above.

A	B	C	D	E	Z
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

To complete this type of question you will need to have a sound knowledge of the different logic gates and their truth tables.

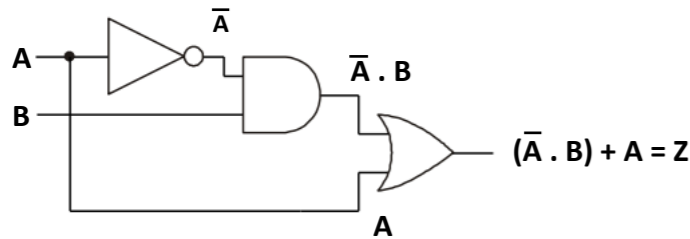
Column D is the opposite of A because it goes through a NOT gate.

Column E is dependant on D and B going through an OR gate.

Column Z is dependant on E and C going through an AND gate.

A	B	C	D	E	Z
0	0	0	1	1	0
0	0	1	1	1	1
0	1	0	1	1	0
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	1	0
1	1	1	0	1	1

Developing Boolean expressions from circuits



Developing Boolean expressions from truth tables

A	B	Z
0	0	1
0	1	0
1	0	1
1	1	1

$\bar{A} \cdot \bar{B}$

$A \cdot \bar{B}$

$A \cdot B$

1 - Look for the rows of the truth table where output Z is high (1).

2 - Create an expression for that row.

3 - Create an overall expression for all of the rows using the OR expression in between.

$$Z = (\bar{A} \cdot \bar{B}) + (A \cdot \bar{B}) + (A \cdot B)$$

Developing a circuit from a Boolean expression

$$(L \cdot M) + \bar{N} = Y$$

1 - Start by figuring out how many logic gates you will need and what type they are.

- In this example there are 3 inputs.
- 2 inputs are going into a AND gate. We know this from the \cdot between the expressions in the brackets.
- The output from that gate is going into an OR gate with the 3rd input. We know this from the $+$ in between the 2 expressions.

