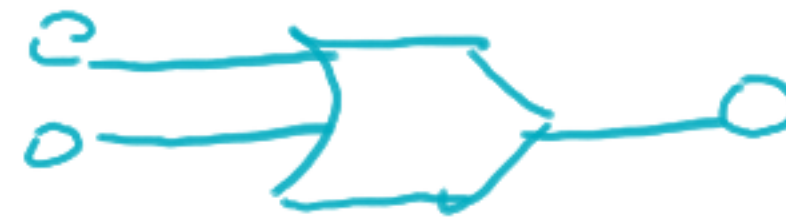
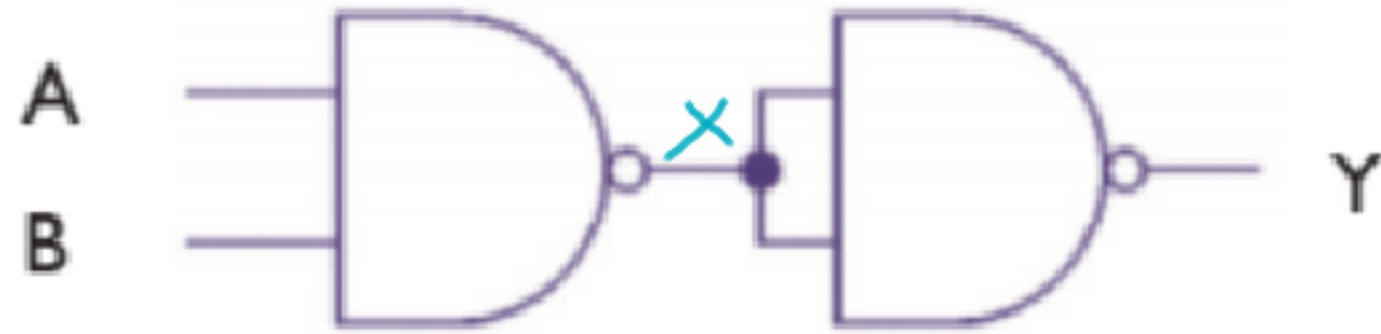


1. Complete the following truth table for the or logic gate:

Inputs		Outputs
A	B	A or B
0	0	0
0	1	1
1	0	1
1	1	1



2. Using a truth table, identify the logic gate produced when two nand gates are combined as shown.



Write the Boolean expression for Y.

A	B	X	Y
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

AND GATE  $\Rightarrow$  X AND Y

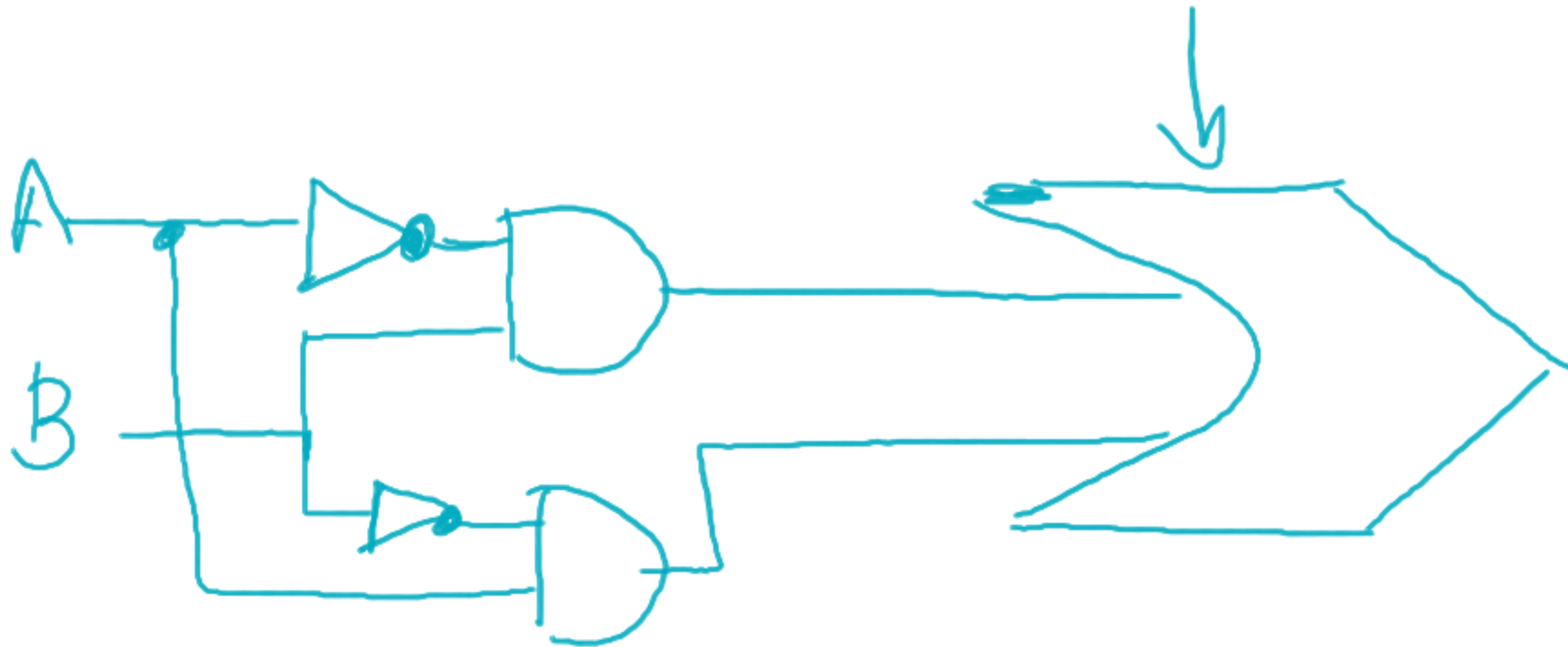
3. Identify the logic gate that will produce the truth table shown.

Input 1	Input 2	Output
1	1	0
1	0	1
0	1	1
0	0	1

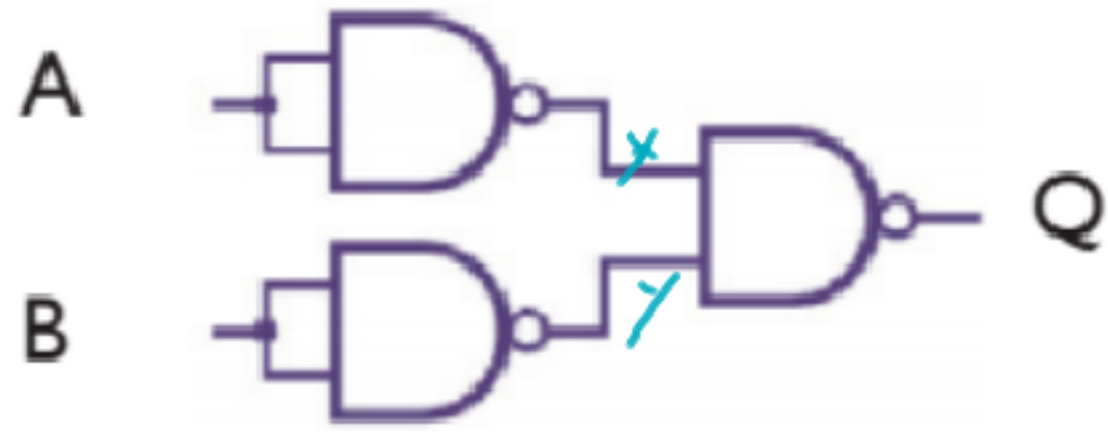
$\Rightarrow$  NAND

4. Draw the diagram of the logic circuit represented by the following Boolean expression:

$$Q = (A \text{ and not } B) \text{ or } (\text{not } A \text{ and } B)$$



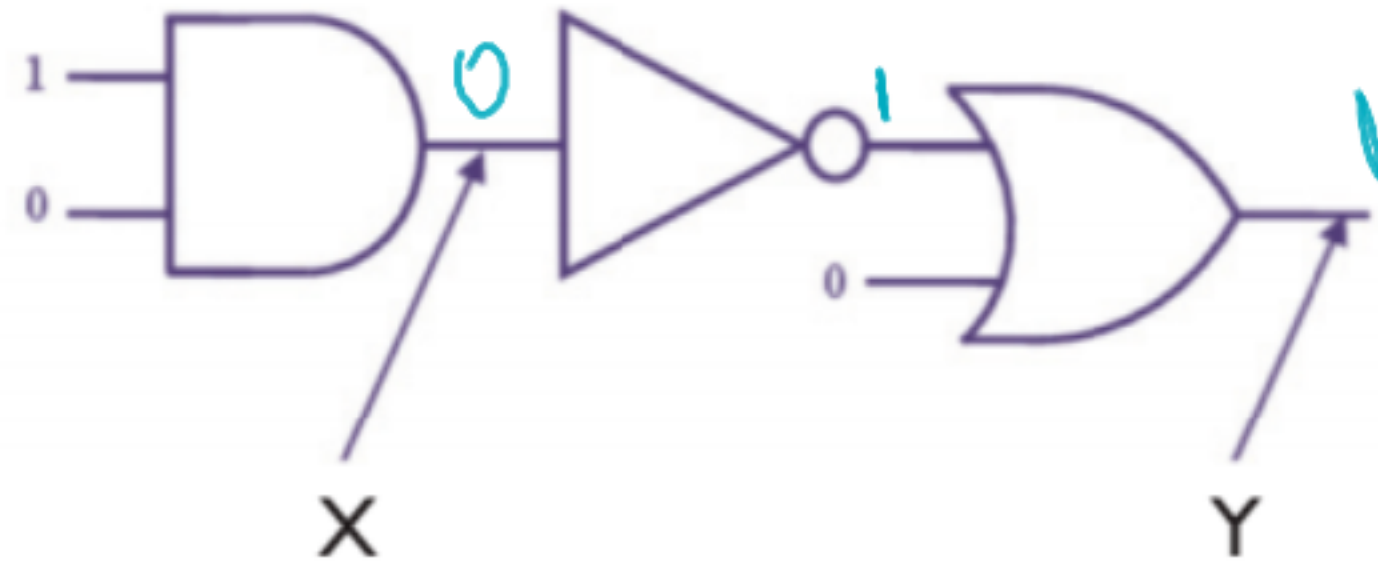
5. Complete the truth table for the circuit below, and see if you can recognise what it represents.



A	B	x	y	Q
0	0	1	1	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	1

⇒ OR Gate

6. Identify the logic states of the circuit at points X and Y.

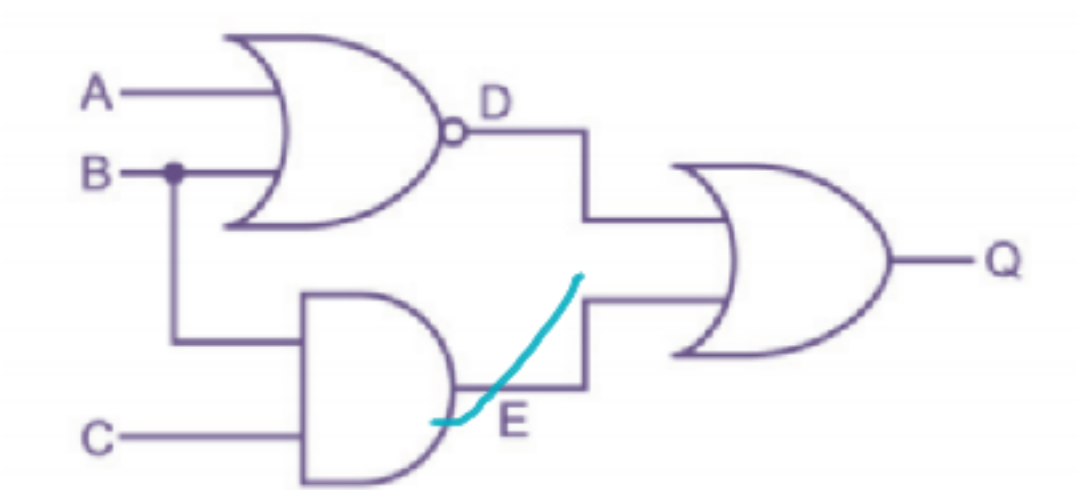


$$X = 0$$

$$Y = 1$$

7. Work out the output at Q in the following arrangement of logic gates. You will need to work out the intermediate outputs, D and E first.

Use a truth table to help you to keep track of the values of each point for each combination of inputs.



A	B	C	D	E	Q
0	0	0	1	0	1
0	0	1	1	0	1
0	0	1	1	0	1
0	1	1	0	1	1
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	0	0
1	1	1	0	1	1

### Shortcuts

If A is 1 then  $D = 0$   
(regardless of B)

If B is 1 then  $D = 0$

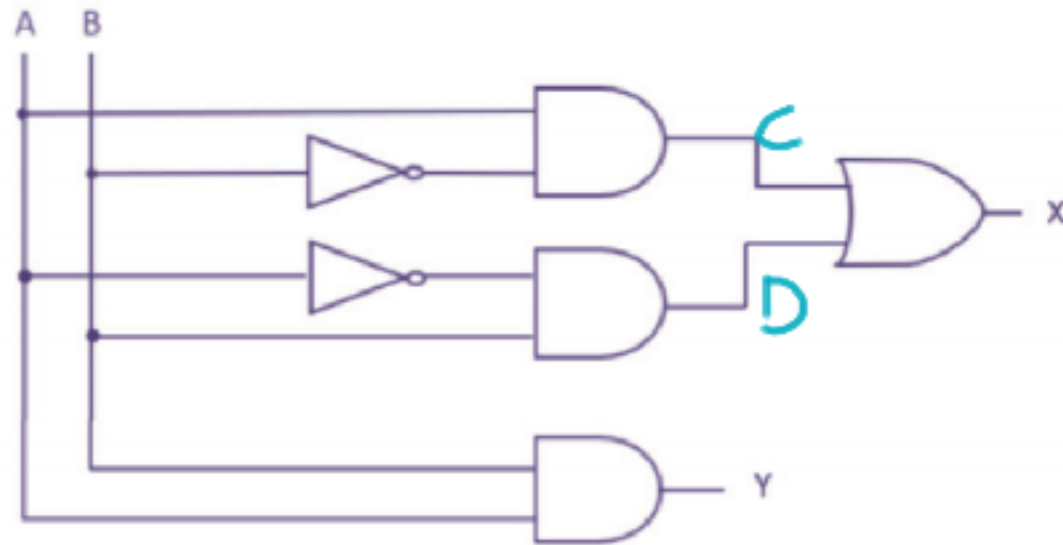
E is only 1 if both B and C are 1

Q is D OR E (only one has to be 1)



8. Note that the following task is for Higher Level students only.

Work out the outputs X and Y in the logic circuit shown. You will need to identify and work out the intermediate outputs first.



Use a truth table to help you to keep track of the values at each point for each combination of inputs. Write the Boolean expression for X.

A	B	C	D	X	Y
0	0	0	0	0	0
0	1	0	1	1	0
1	0	1	0	1	0
1	1	0	0	0	1

Y is A AND B (both must be 1)  
If A is 0 then C=0  
If B is 0 then D=0