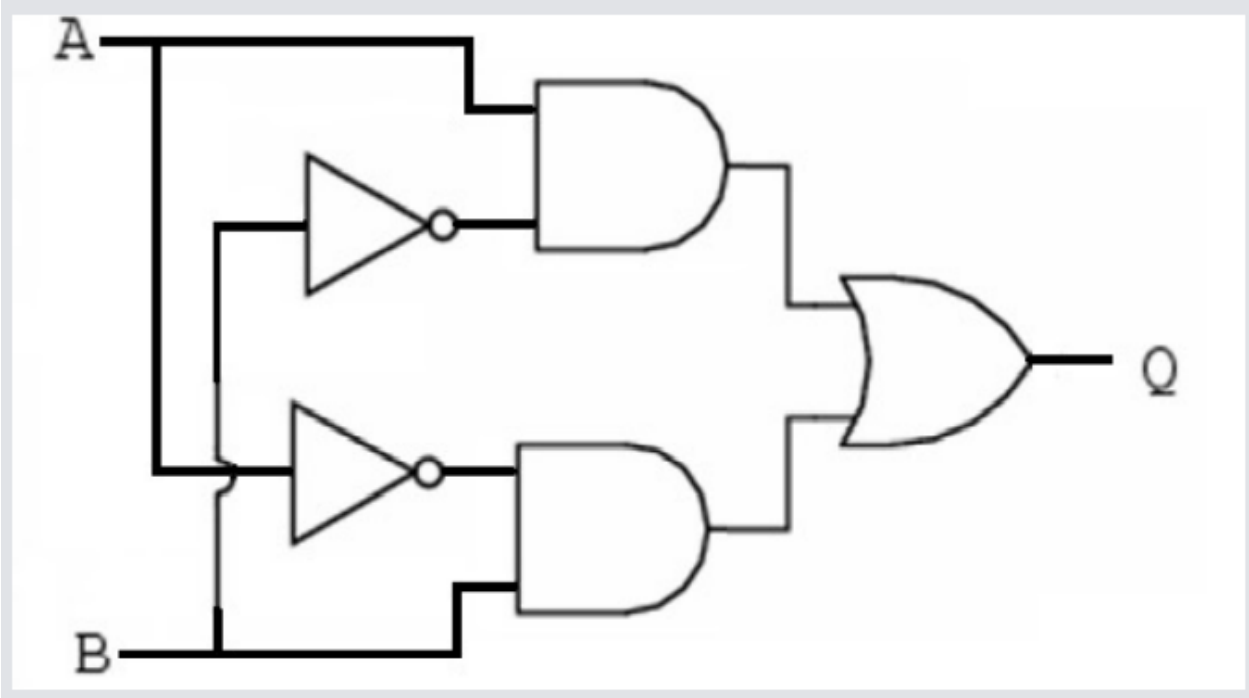
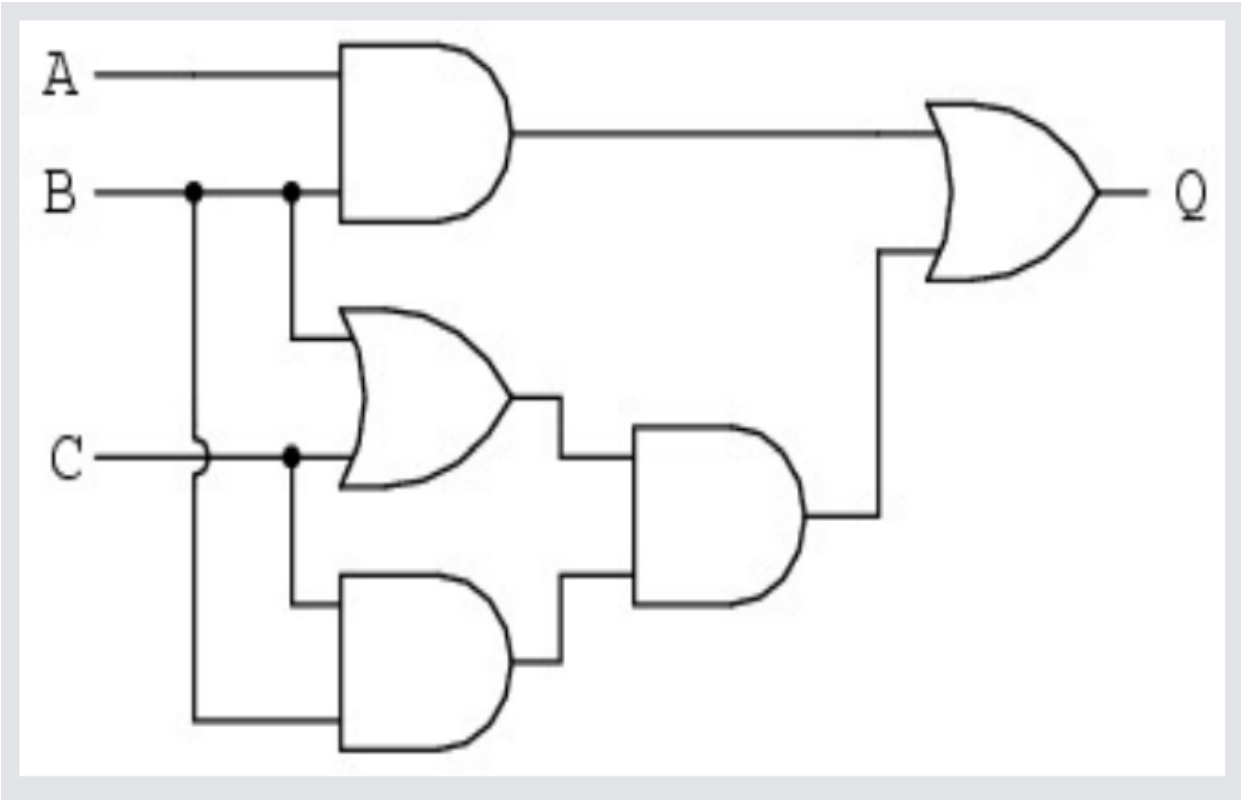
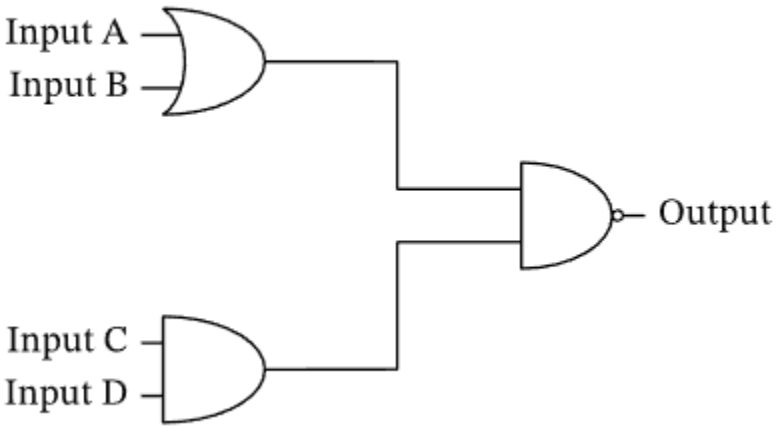
# Tutorial 2

1. Find out 3 real world applications of logic gates
2. Derive the boolean expression for the following combinational logic gates




A
B
C
Q

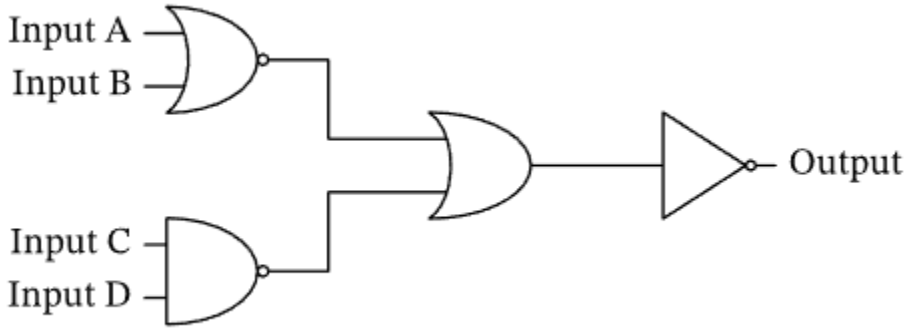
3. The diagram shows a logic circuit consisting of multiple logic gates. The table shows the output for some of the different possible combinations of inputs.




| Input A | Input B | Input C | Input D | Output |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | $p$ |
| 0 | 0 | 1 | 1 | $q$ |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | $r$ |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | $s$ |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 |

1. What is the value of $p$ in the table?
2. What is the value of $q$ in the table?
3. What is the value of $r$ in the table?
4. What is the value of $s$ in the table?

4. The diagram shows a logic circuit consisting of multiple logic gates. The table shows the output for some of the different possible combinations of inputs.




| Input A | Input B | Input C | Input D | Output |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | $p$ |
| 0 | 1 | 1 | 0 | $q$ |
| 1 | 0 | 1 | 1 | $r$ |
| 1 | 1 | 0 | 1 | $s$ |

What is the value of $p$ in the table?

What is the value of $q$ in the table?

What is the value of $r$ in the table?

What is the value of $s$ in the table?