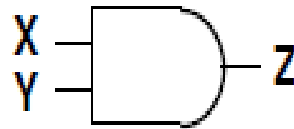


The left side of the slide features a series of vertical stripes in various shades of light blue and grey. Overlaid on these stripes are several dark blue circles of different sizes, arranged in a vertical, slightly staggered pattern.

LOGIC GATES

Logic gates and truth tables

◆ AND $X \cdot Y$ XY



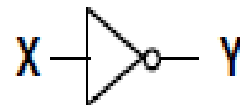
| X | Y | Z |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

◆ OR $X + Y$



| X | Y | Z |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

◆ NOT \overline{X} X'



| X | Y |
|---|---|
| 0 | 1 |
| 1 | 0 |

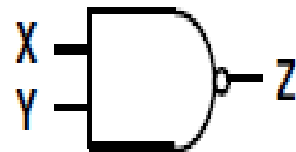


Logic gates and truth tables (con't)

◆ NAND

$$\overline{X \bullet Y}$$

$$\overline{XY}$$



| X | Y | Z |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

◆ NOR

$$\overline{X + Y}$$



| X | Y | Z |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

◆ XOR

$$X \oplus Y$$

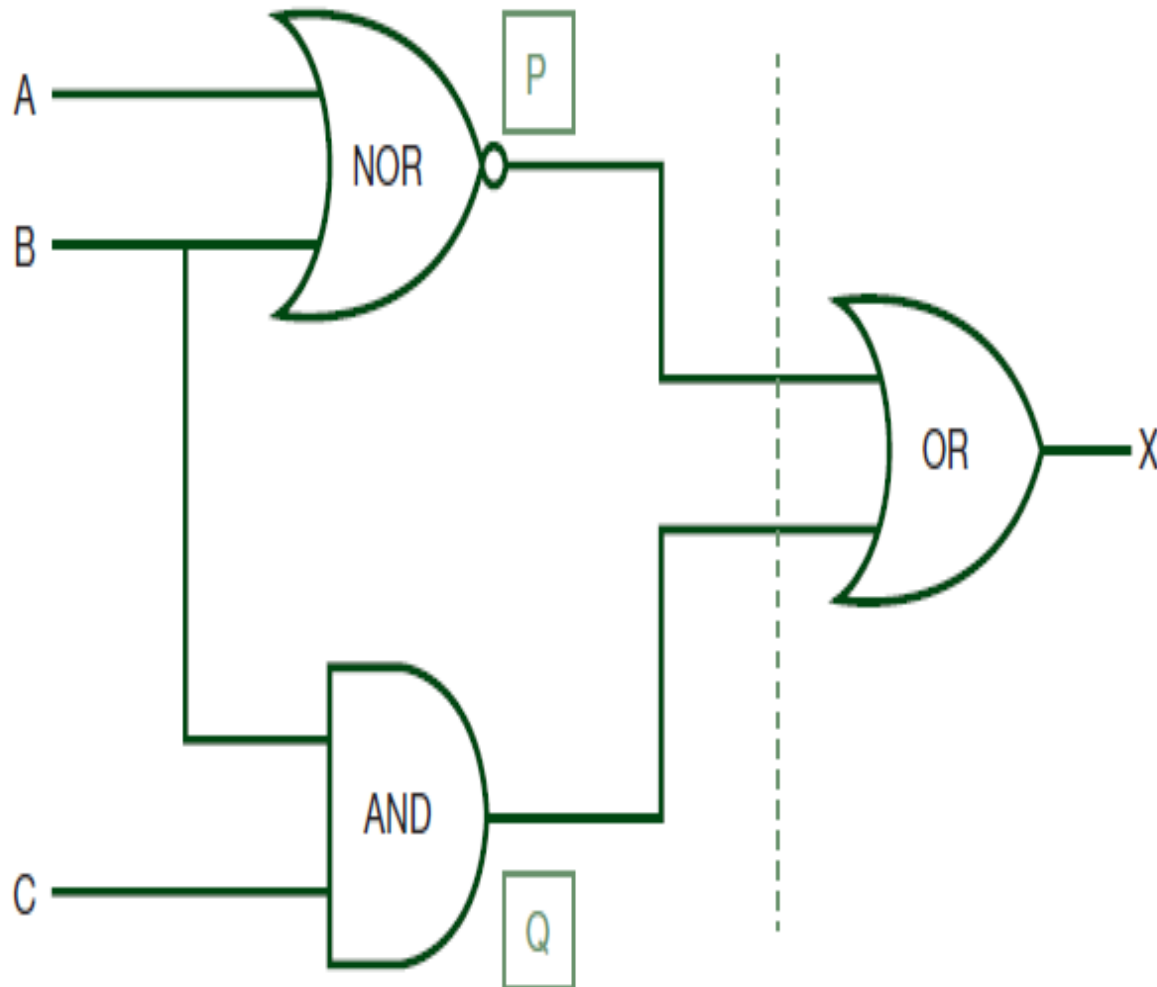


| X | Y | Z |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

... ..

Example 1

Produce a truth table from the following logic circuit (network).



To show how this works, we will split the logic circuit into two parts (shown by the dotted line).

We thus get:

| INPUT A | INPUT B | INPUT C | OUTPUT P | OUTPUT Q |
|---------|---------|---------|----------|----------|
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0 | 1 |



| INPUT P | INPUT Q | OUTPUT X |
|---------|---------|----------|
| 1 | 0 | 1 |
| 1 | 0 | 1 |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 1 | 1 |



Examples:

Draw construct logic circuit and construct truth table

1- $\overline{(A + B)} + AB$

2- $A + BC + \bar{D}$

3- $(A + B)C$

4- $AB + \overline{AC}$

5- $\overline{(\bar{A} + B)}(C + D) \bar{C}$

