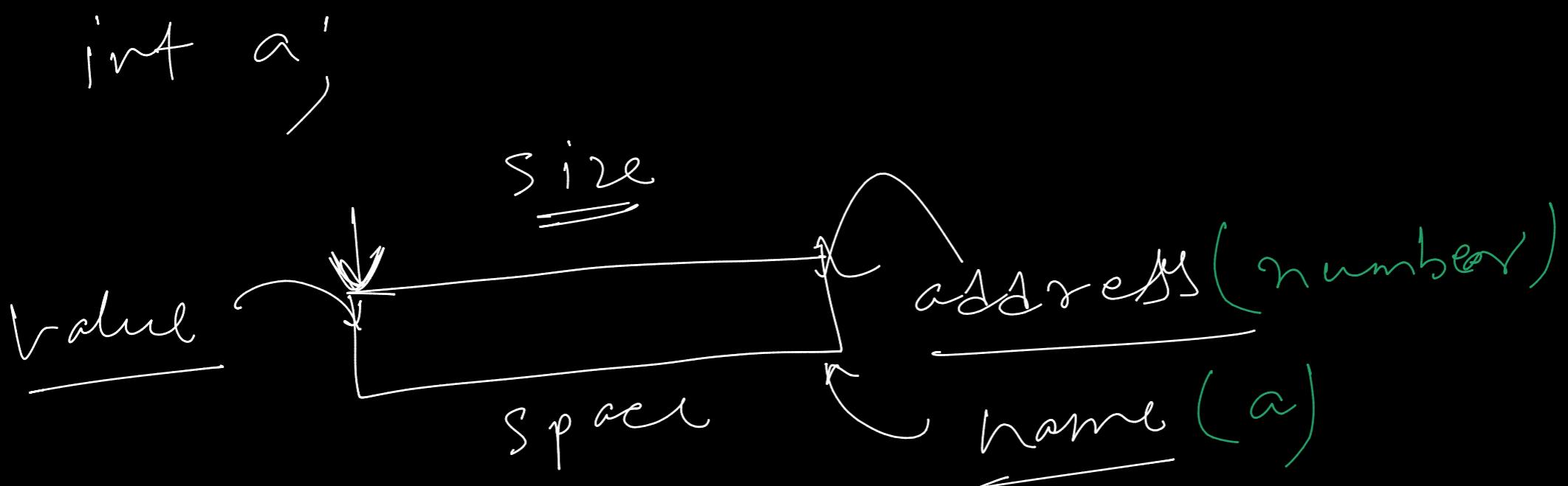


# Variables



a = 5  
printf("%d", a)

<u>size</u>	<u>Value</u>	
bit	0, 1	□ → 2
8 bit	1 byte	① 2 2
1024 byte	1 KB	7
1.024 MB	1 MB	⑧
1024 MB	4 GB	$2^8 = 256$

Computer memory manage → bytes

0 0
0 1
1 0
1 1

$$\begin{array}{r} 125 \\ \hline 1 \ 2 \ 5 \\ 2 \downarrow \ 0 \end{array} \quad 1 \times 10^2 + 2 \times 10^1 + 5 \times 10^0 = 125$$

$$\begin{array}{r} 1011 \\ 111 \\ \hline 11010 \end{array} \quad 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 11$$

(125)<sub>10</sub> = (?)<sub>2</sub>

$$\begin{array}{r} 125 \\ \hline 2 | 62 | 6 \\ \hline 31 | 1 \\ \hline 15 | \\ 2 | \\ 3 | \\ \hline & 1 \end{array}$$

$$64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ | \ 1 \ 1 \ 1 \ 1 \ 0$$

$$64 + 32 + 16 + 8 + 4 + 1 = 125$$

Decimal  
base - 10  
(0, 1, 2, ..., 9)

Binary  
base - 2  
(0, 1)

Octal  
base - 8  
(0 - 7)

Hexadecimal

base - 16  
(0 - 9, a - f)

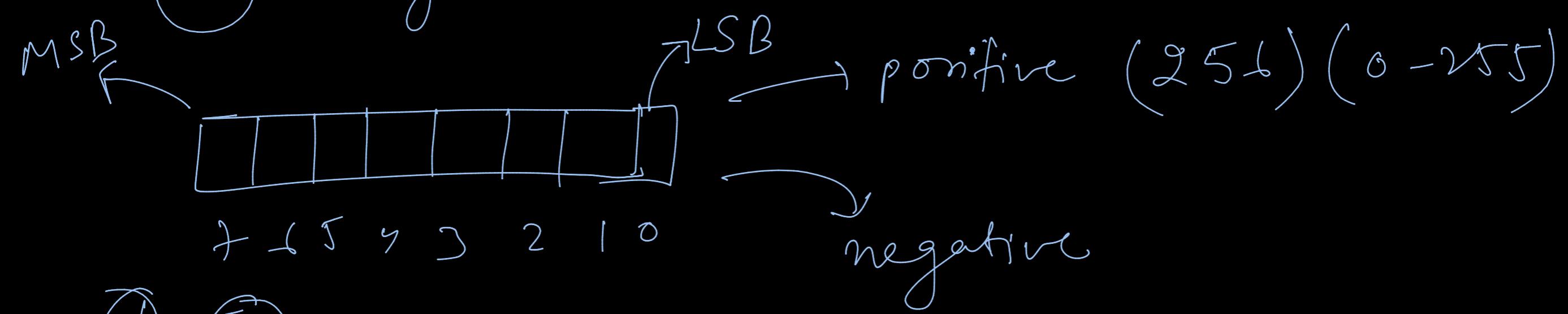
base 64

@ -





# ① Signed Bit Method



more significant  
less significant

**MSB** → 0 (positive)  
→ 1 (negative)

1 bit

0 0 | 0 → 2

↳ **MSB** = 0 (positive)

$$(0010)_2 = (2)_{10}$$

0 1 0 → -2

↳ **MSB** = 1 (negative)

Signed

positive / negative

-2

Unsigned

only positive

1010 ↳ 10

5-bit system

→ 1 byte

0010 = -2  
MSB

000010 → -2  
MSD

Size  
 $\frac{1}{2}$

Possibility / state

Value  
Unsigned  
0-3  
(-1, 1)

4      16      (0-15)      (-7, 7)  
8      256      (0-255)      (-127, 127)

Operations

Arithmetic

Addition  
Subtraction  
Multiplication  
Division

Logical

OR  
AND  
NOT  
NOR  
NAND

XOR

Unsigned

$$\begin{array}{r}
 & 1 & 0 & 1 & 1 \\
 + & 0 & 1 & 1 & 1 \\
 \hline
 & 1 & 0 & 0 & 0
 \end{array}$$

Qm  $(140)_{10}$

$$\begin{array}{r}
 16 \quad | \quad 140 \quad | \quad 12 \\
 \hline
 8
 \end{array}$$

$$(8<)_{16}$$

2 af

$ex 256 + ax 16 + f$

$$256 / 16 =$$

$$\begin{array}{ccc}
 1^2 & 1^1 & 1^0 \\
 c & a & f
 \end{array}$$

$$\begin{aligned}
 ex 256 + ax 16 + f \times 1 &= 14 \times 256 \\
 &\quad + 10 \times 16 + 15
 \end{aligned}$$

$$= 3584 + (20 + 5)$$

$$= (3749)_{10}$$

$$\begin{array}{r} \left( \begin{array}{cc} \textcircled{c} & 1 \end{array} \right) \\ \times \quad \begin{array}{ccc} 1 & 1 \end{array} \\ \hline \left( \begin{array}{ccc} \textcircled{c} & 1 & 1 \end{array} \right) \\ 6 \quad \begin{array}{cc} 1 & 1 \end{array} \\ \hline \left( \begin{array}{cccc} \textcircled{c} & \textcircled{c} & 0 & 0 \end{array} \right) \end{array}$$

A hand-drawn diagram consisting of several elements:

- Two sets of brackets on the left side:
  - The first set consists of a vertical line and a curved brace that spans two vertical lines.
  - The second set consists of a vertical line and a curved brace that spans three vertical lines.
- A horizontal line above the second set of brackets, ending in a vertical bar at its right end.
- A large, thin-lined arrow pointing horizontally to the right, originating from the right side of the second set of brackets.
- Two sets of brackets on the right side:
  - The first set consists of a vertical line and a curved brace that spans two vertical lines.
  - The second set consists of a vertical line and a curved brace that spans three vertical lines.

$$\begin{array}{r} \overline{1} \\ \overline{1} \\ \hline \overline{0} \end{array}$$

$$\begin{array}{r}
 101010 \\
 + 10 \\
 \hline
 101100
 \end{array}$$

$$\begin{array}{r}
 10 \\
 \times 10 \\
 \hline
 - \\
 \hline
 \end{array}$$

## Logical Operation

AND

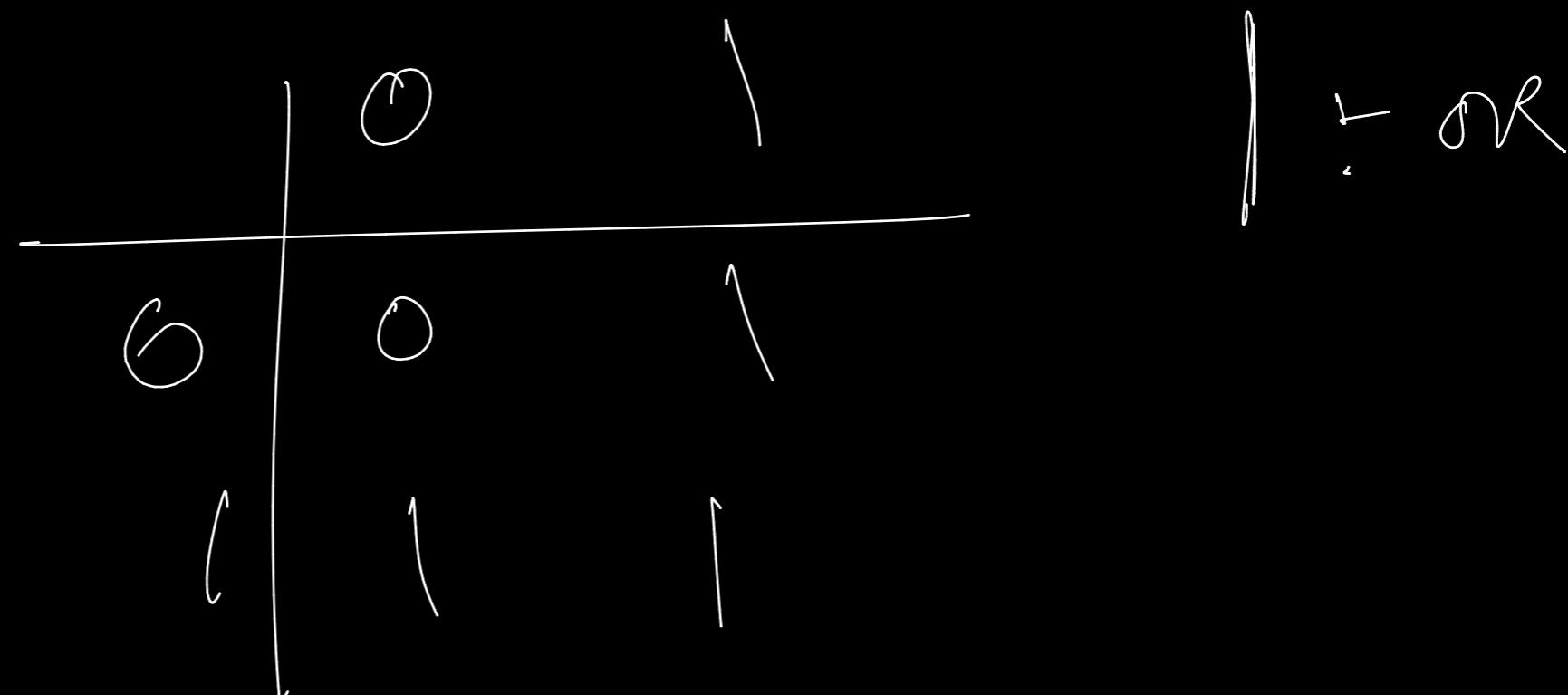
$$1 \wedge 1 = 1 \quad \text{: AND}$$

$$0 \wedge 0 = 0$$

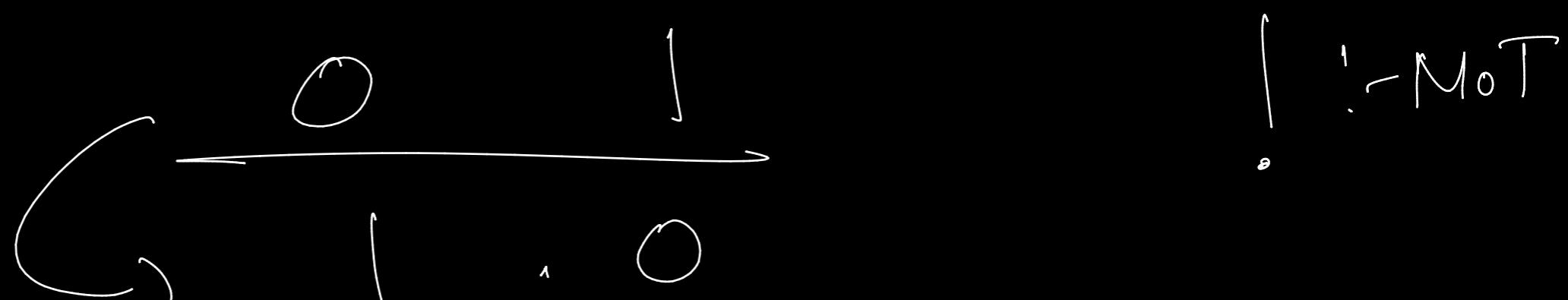
$$1 \wedge 0 = 0$$

$$0 \wedge \emptyset = 0$$

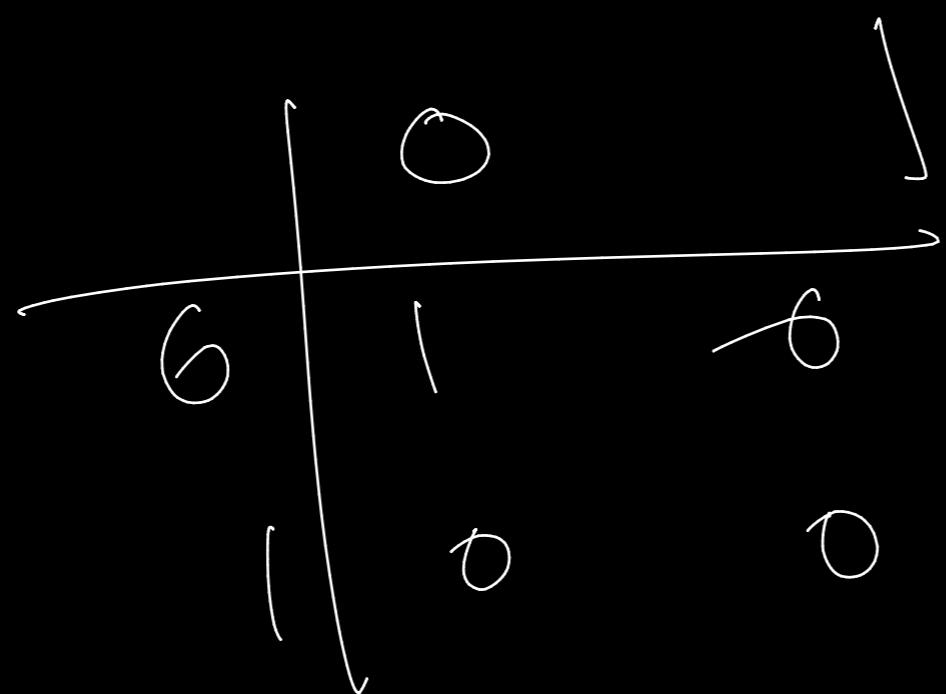
OR



NOT



NOR  $\rightarrow$  NOT OR

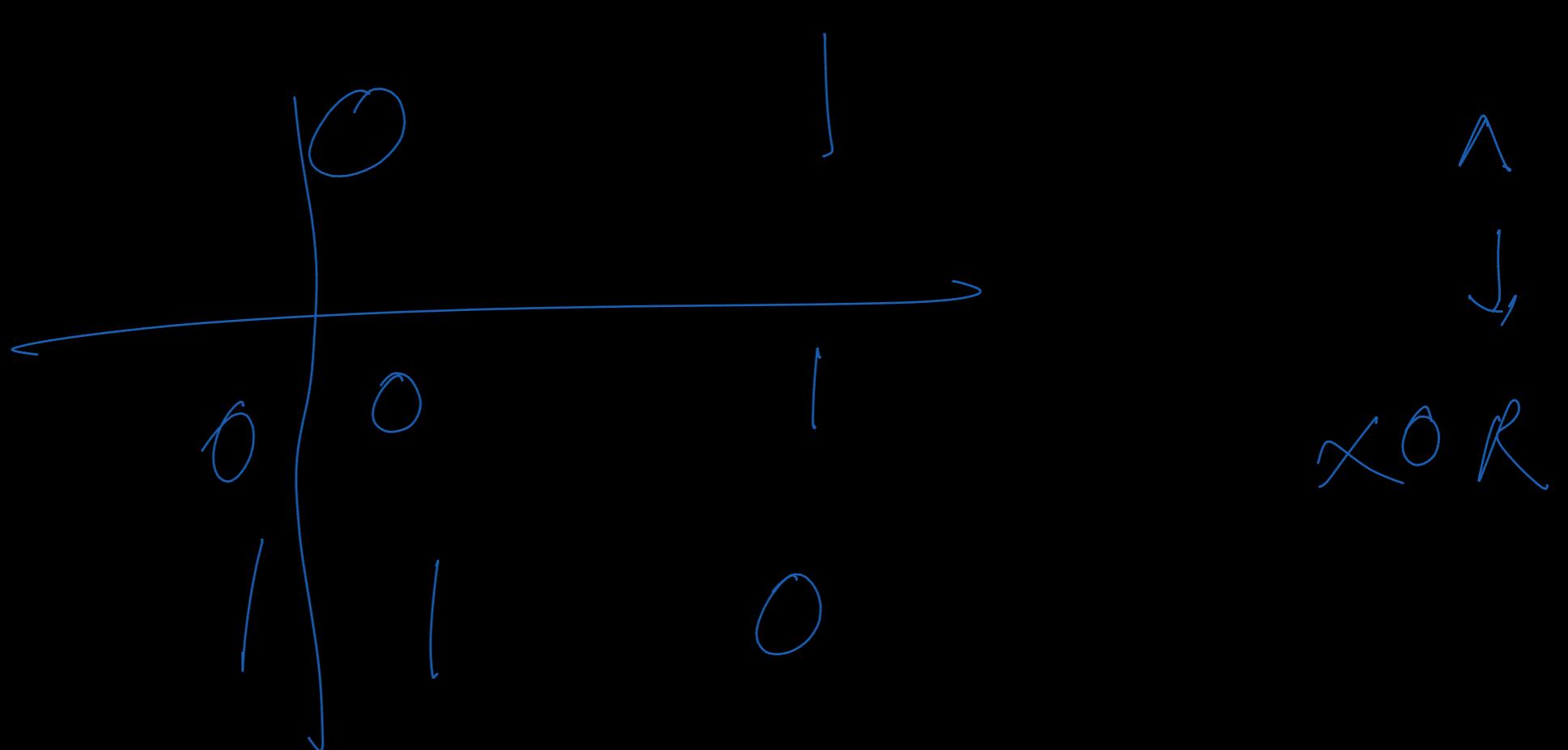


NAND  $\rightarrow$  NOT AND

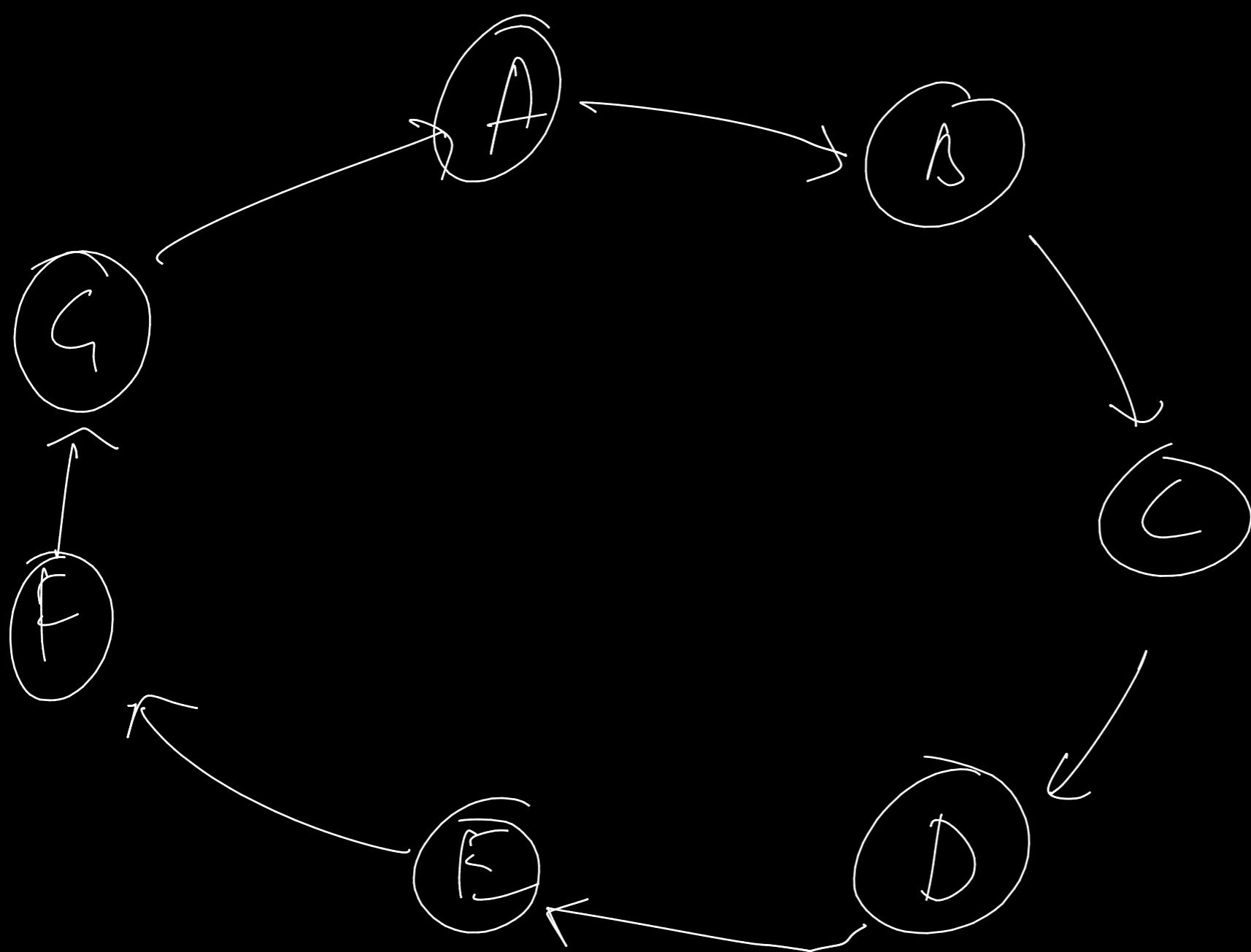
XOR  $\rightarrow$  exclusive OR

(OR - either of the  
input is 1)

(XOR  $\rightarrow$  only one input  
is 1)







A B C D E F G A

A B

C D

F G

B A C D F G B