


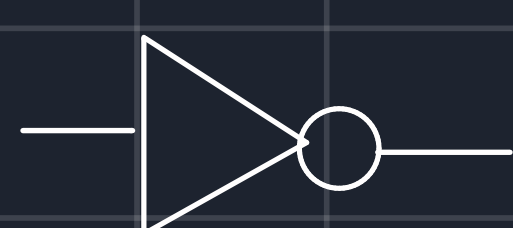




# 1. gyakorlat



Kapuk ismétlése  $\Rightarrow$    $\Rightarrow$  

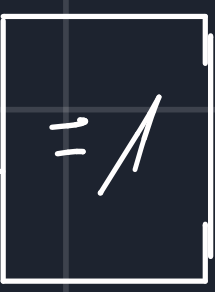
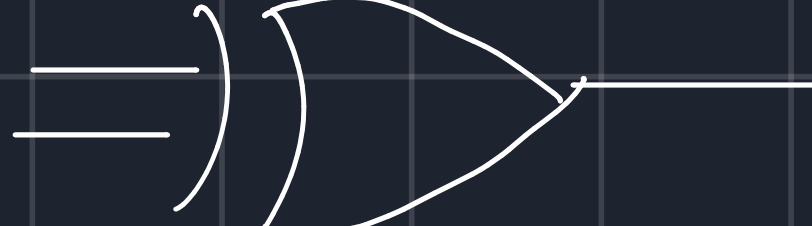
Inverter  $A \rightarrow$    $\rightarrow \bar{A}$  


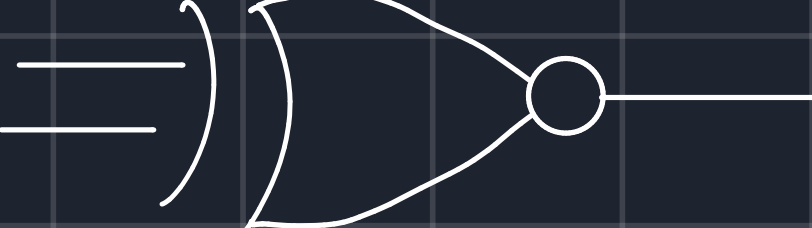
ÉS  $\frac{A}{B} =$    $A \cdot B$   $\Rightarrow$  

VAGY  $\frac{A}{B} =$    $A + B$   $\Rightarrow$  

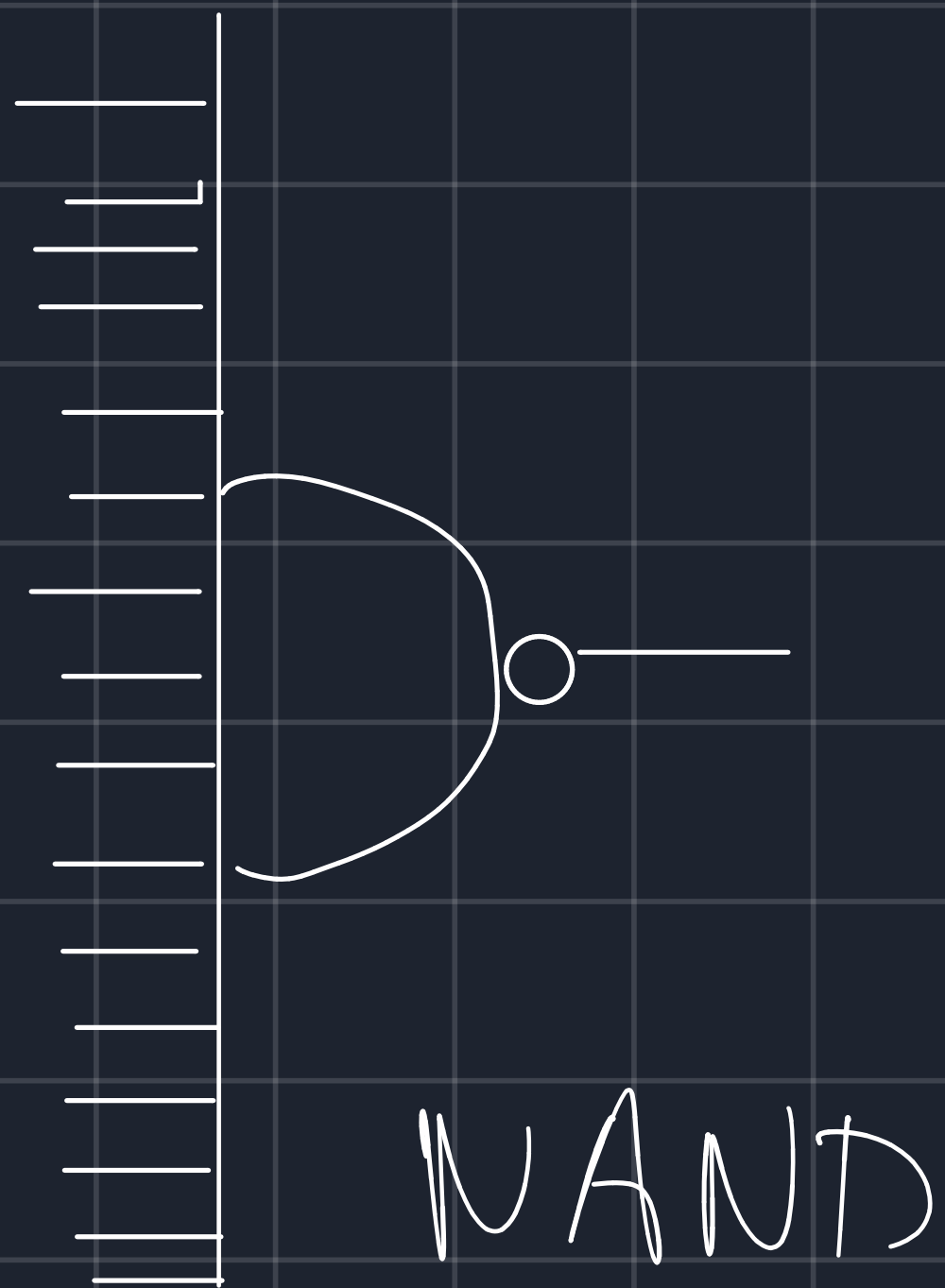
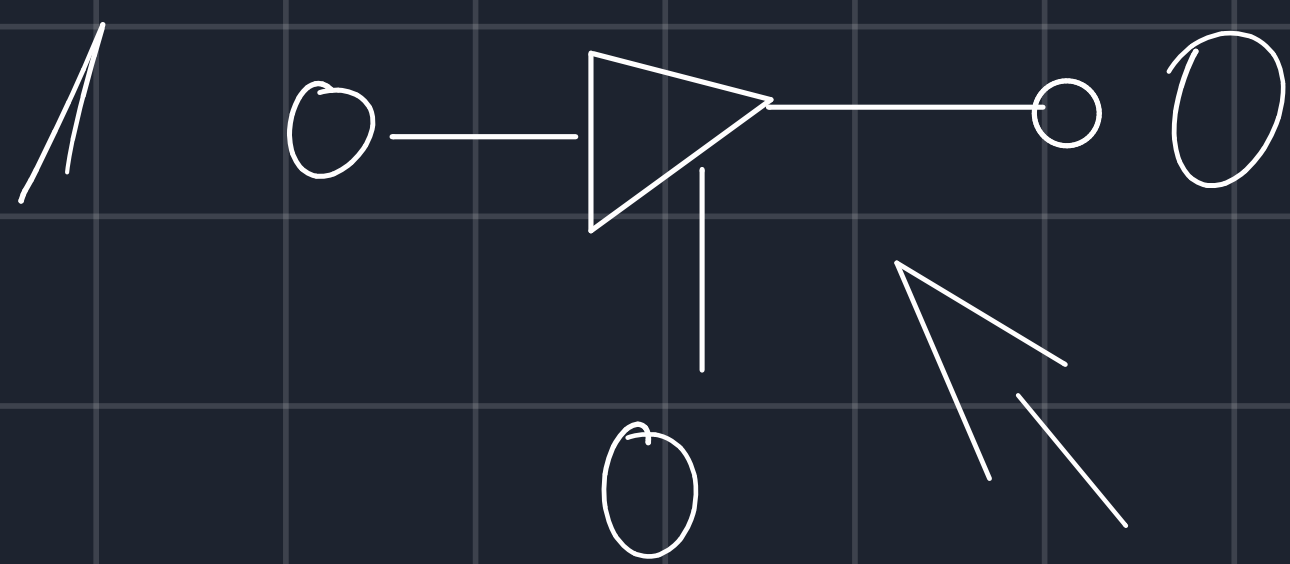
NAND  $\frac{A}{B} =$    $\rightarrow \overline{A \cdot B}$   $\Rightarrow$  

NOR  $\frac{A}{B} =$    $\rightarrow \overline{A + B}$   $\Rightarrow$  

XOR  $\frac{A}{B} =$    $A \oplus B$   $\Rightarrow$  

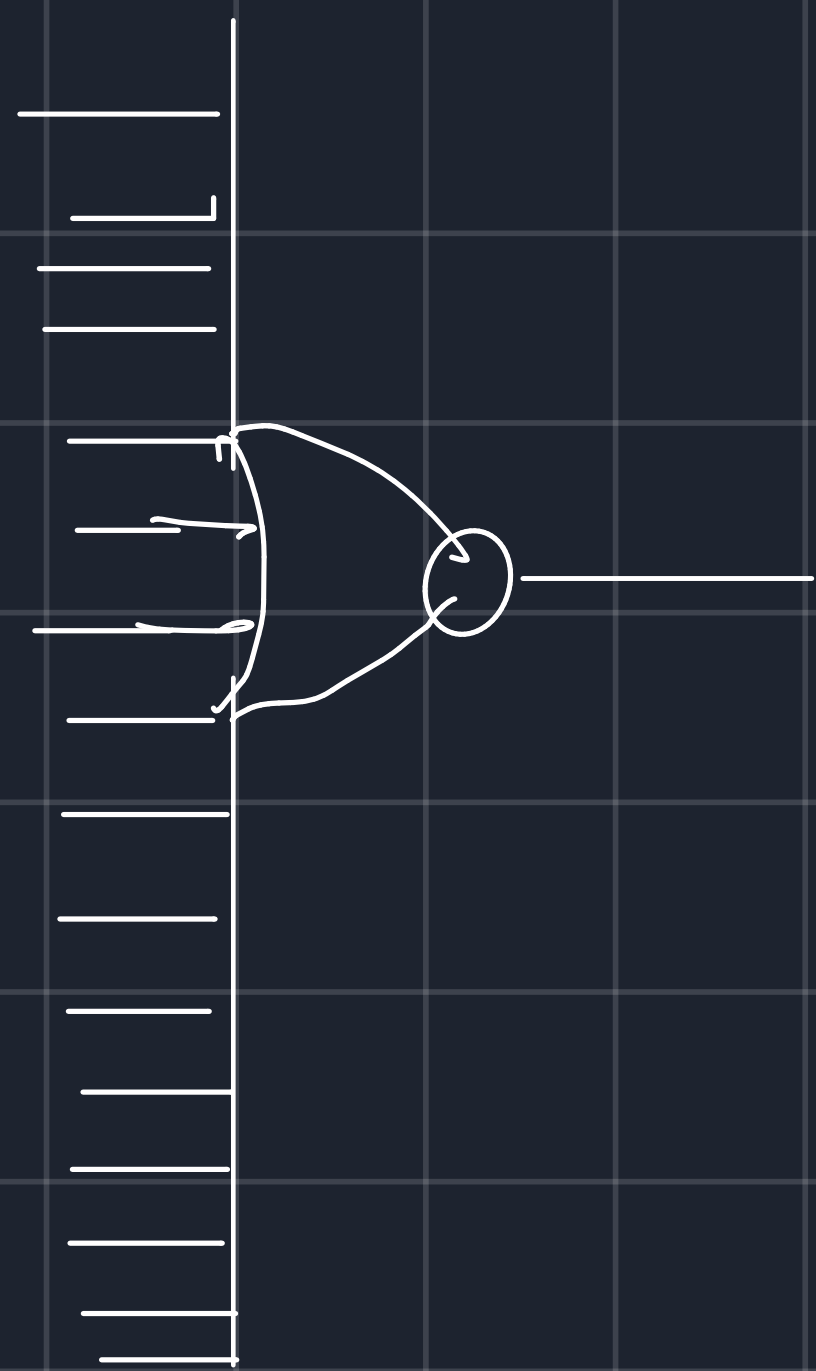
XNOR  $\frac{A}{B} =$    $A \equiv B$   $\Rightarrow$  

Jelism.  $\rightarrow$   



Mikor ad 0-t?

ha 16 db 1-es  
bejuttat van

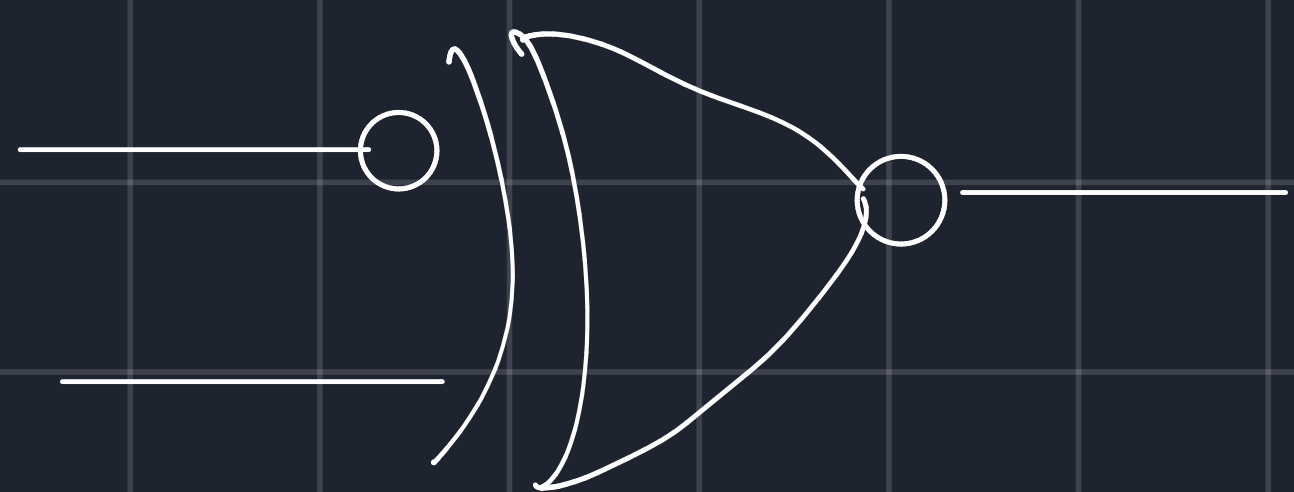
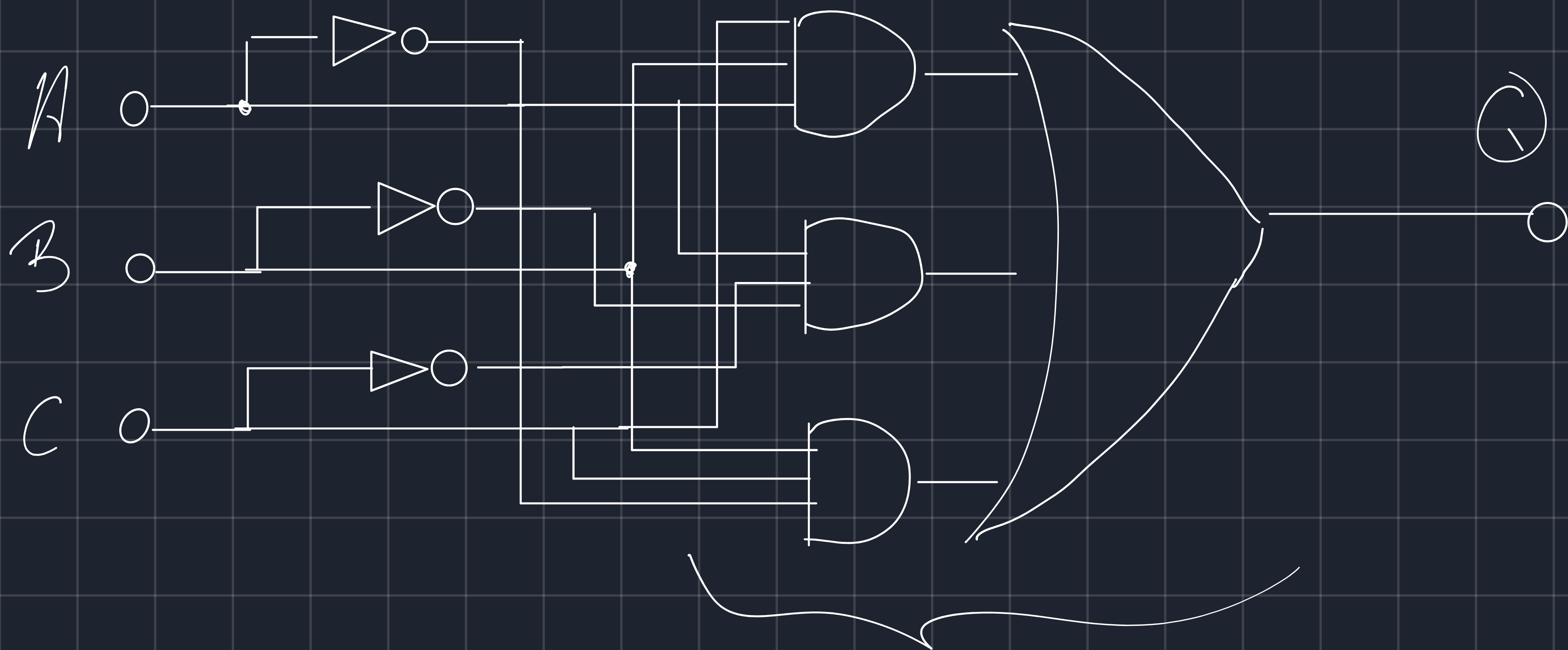


Mikor ad 0-t?

Ita bármely beemenet 0.

NOR

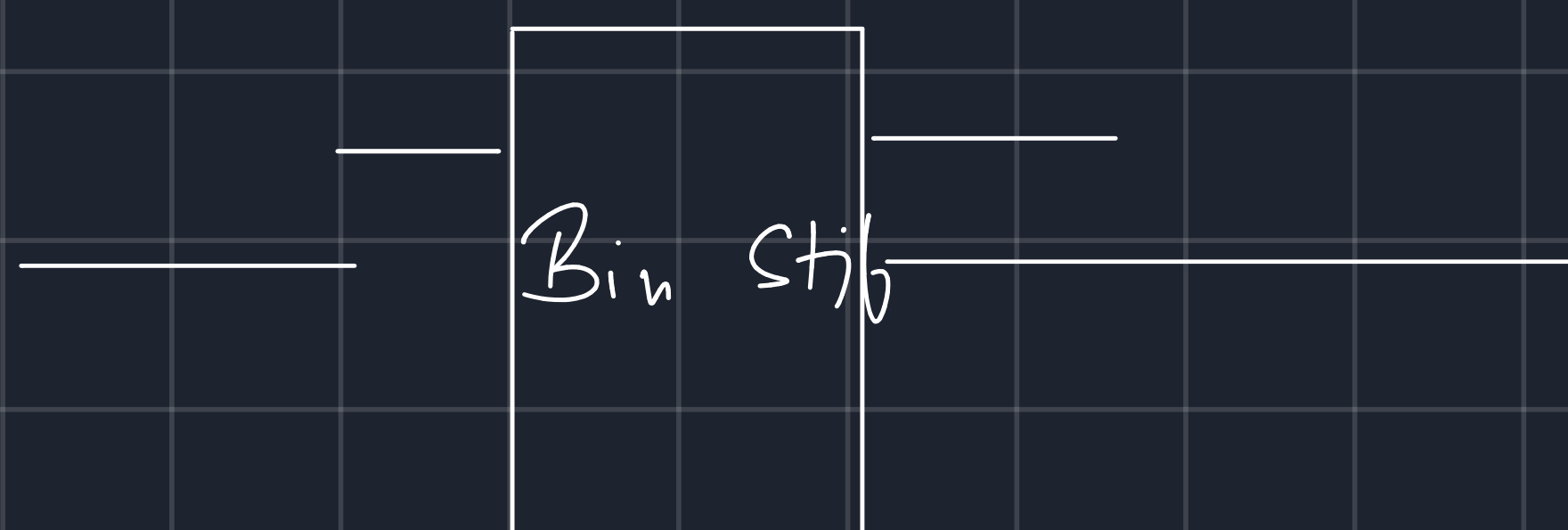
$$Q = ABC + \bar{A}\bar{B}\bar{C} + \bar{A}BC$$



$$\bar{A} \equiv B$$

NAND ugyan ez, csak minden kapu NAND-ra van cserélve.

Bináris  $\rightarrow$  Stíbitz átalakító áramkör



0	0011 ←
1	0100
2	0101
3	0110

3-a! eltelt idő.

Dec	Binaris	Stibitz
0	0000	0011
1	0001	0100
2	0010	0101
3	0011	0110
4	0100	0111
5	0101	1000
6	0110	1001
7	0111	1010
8	1000	1011
9	1001	1100
10	1010	1101
11	1011	1110
12	1100	1111
13	1101	0000
14	1110	0001
15	1111	0010
	ABCD	Q <sub>1</sub> Q <sub>2</sub> Q <sub>3</sub> Q <sub>4</sub>

$$\begin{array}{r}
 4: 1001 \\
 \nearrow 0001 \\
 \hline
 1010 : 16 \neq 10
 \end{array}$$

0 → 9

$$\begin{array}{cc}
 \underbrace{0001}_{10} & \underbrace{0000}_0
 \end{array}$$

← közbüös kombinációk

$Q_1$

	<u>C</u>			
	0 <sub>0</sub>	0 <sub>1</sub>	0 <sub>3</sub>	0 <sub>2</sub>
	0 <sub>4</sub>	1 <sub>5</sub>	1 <sub>7</sub>	1 <sub>6</sub>
A	X <sub>8</sub>	X <sub>9</sub>	X <sub>11</sub>	X <sub>10</sub>
	1 <sub>12</sub>	1 <sub>13</sub>	X <sub>15</sub>	X <sub>14</sub>
	<u>D</u>			

$$Q_1 = BC + A + BD$$

$$Q_2 = \overline{B}D + \overline{B}C + B\overline{C}\overline{D}$$

$$Q_3 = CD + \overline{C}\overline{D}$$

$$Q_4 = \overline{D}$$

$Q_2$

	<u>C</u>			
	0 <sub>0</sub>	1 <sub>1</sub>	1 <sub>3</sub>	1 <sub>2</sub>
	1 <sub>4</sub>	0 <sub>5</sub>	0 <sub>7</sub>	0 <sub>6</sub>
A	X <sub>11</sub>	X <sub>13</sub>	X <sub>15</sub>	X <sub>14</sub>
	0 <sub>8</sub>	1 <sub>9</sub>	X <sub>11</sub>	X <sub>10</sub>
	<u>D</u>			

$Q_2$

	<u>C</u>			
	1	0	1	0
	1	0	1	0
A	X	X	X	X
	1	0	X	X
	<u>D</u>			

$Q_4$

	<u>C</u>			
	1	0	0	1
	1	0	0	1
A	X	X	X	X
	1	0	X	X
	<u>D</u>			