Laboratórna úloha číslo 1

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1. GitHub:

Link repozitára: https://github.com/DaNNym99/Digital-electronics-1

2. De Morgánove zákony:

Rovnice:

$$f_{(a,b,c)} = \overline{b} \cdot a + \overline{c} \cdot \overline{b}$$

$$f_{NAND(a,b,c)} = \overline{\overline{\overline{b} \cdot a \cdot \overline{c} \cdot \overline{b}}}$$

$$f_{NOR(a,b,c)} = \overline{\overline{b \cdot \overline{a} \cdot c \cdot b}}$$

Program vhdl :

```
architecture dataflow of gates is
begin
    f_o  <= ((not b_i)and a_i) or ((not c_i) and (not b_i));
    fnand_o <= (('1' nand b_i) nand a_i) nand (('1' nand c_i) nand ('1' nand
b_i));
    fnor_o <= '0' nor ((b_i nor ('0' nor a_i)) nor (c_i nor b_i));

end architecture dataflow;
```

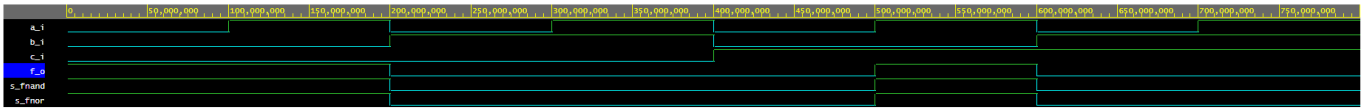
Link pre edaplayground (De Morgánove zákony): https://www.edaplayground.com/x/aXrz

Výstup z programu edaplayground:

c	b	a	f(c,b,a)	fNAND(c,b,a)	fNOR(c,b,a)
0	0	0	1	1	1
0	0	1	1	1	1
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	1	1	1
1	1	0	0	0	0

c	b	a	f(c,b,a)	fNAND(c,b,a)	fNOR(c,b,a)
1	1	1	0	0	0

Obrázok výstupu:



3. Distributívne zákony:

Rovnice:

$$\overbrace{x \cdot y + x \cdot z}^{DL11} = \overbrace{x \cdot (y + z)}^{DL12}$$

$$\overbrace{(x + y) \cdot (x + z)}^{DL21} = \overbrace{x + (y \cdot z)}^{DL22}$$

Program vhdl :

```
architecture dataflow of gates is
begin
    Distributivelaw11_o <= (x_i and y_i) or (x_i and z_i);
    Distributivelaw12_o <= x_i and (y_i or z_i);
    Distributivelaw21_o <= (x_i or y_i) and (x_i or z_i);
    Distributivelaw22_o <= x_i or (y_i and z_i);

end architecture dataflow;
```

Link pre edaplayground (Distributívne zákony): https://www.edaplayground.com/x/8MeM

Výstup z programu edaplayground:

z	y	x	DL11(x,y,z)	DL12(x,y,z)	DL21(x,y,z)	DL22(x,y,z)
0	0	0	0	0	0	0
0	0	1	0	0	1	1
0	1	0	0	0	0	0
0	1	1	1	1	1	1
1	0	0	0	0	0	0
1	0	1	1	1	1	1
1	1	0	0	0	1	1
1	1	1	1	1	1	1

Obrázok výstupu: