Digitalna vezja
UL, FRI

Vaja 1 Booleova algebra, Logisim, breadboard

Booleova algebra

- Nizka (0 V) in visoka (5 V) napetost → Low/High

  Abstrakcija: dva logična nivoja
- Signal → preklopna (logična) spremenljivka : False/True, 0/1

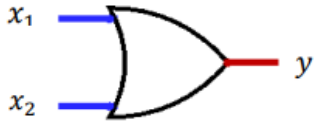
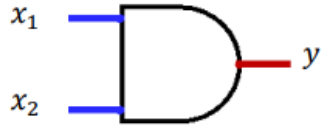
- Preklopna funkcija: funkcija nad preklopnimi spremenljivkami

  Logični izraz (enačba)

  Pravilnostna tabela
- Logična funkcija → digitalno vezje

Osnovne preklopne funkcije

- Osnovne operacije Booleove algebre:

Negacija (NE, NOT)	Disjunkcija (ALI, OR)	Konjukcija (IN, AND)
$y = \bar{x}$	$y = x_1 \vee x_2$	$y = x_1 \cdot x_2$
		

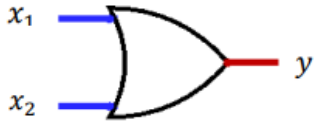
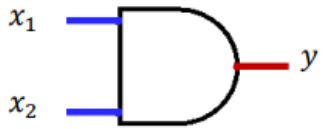
x	$y = \bar{x}$

x_1	x_2	$y = x_1 \vee x_2$

x_1	x_2	$y = x_1 \cdot x_2$

Osnovne preklopne funkcije

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$y = \bar{x}$	$y = x_1 \vee x_2$	$y = x_1 \cdot x_2$
		

x	$y = \bar{x}$
0	1
1	0

x_1	x_2	$y = x_1 \vee x_2$
0	0	0
0	1	1
1	0	1
1	1	1

x_1	x_2	$y = x_1 \cdot x_2$
0	0	0
0	1	0
1	0	0
1	1	1

Naloga 1: Realizacija vezja

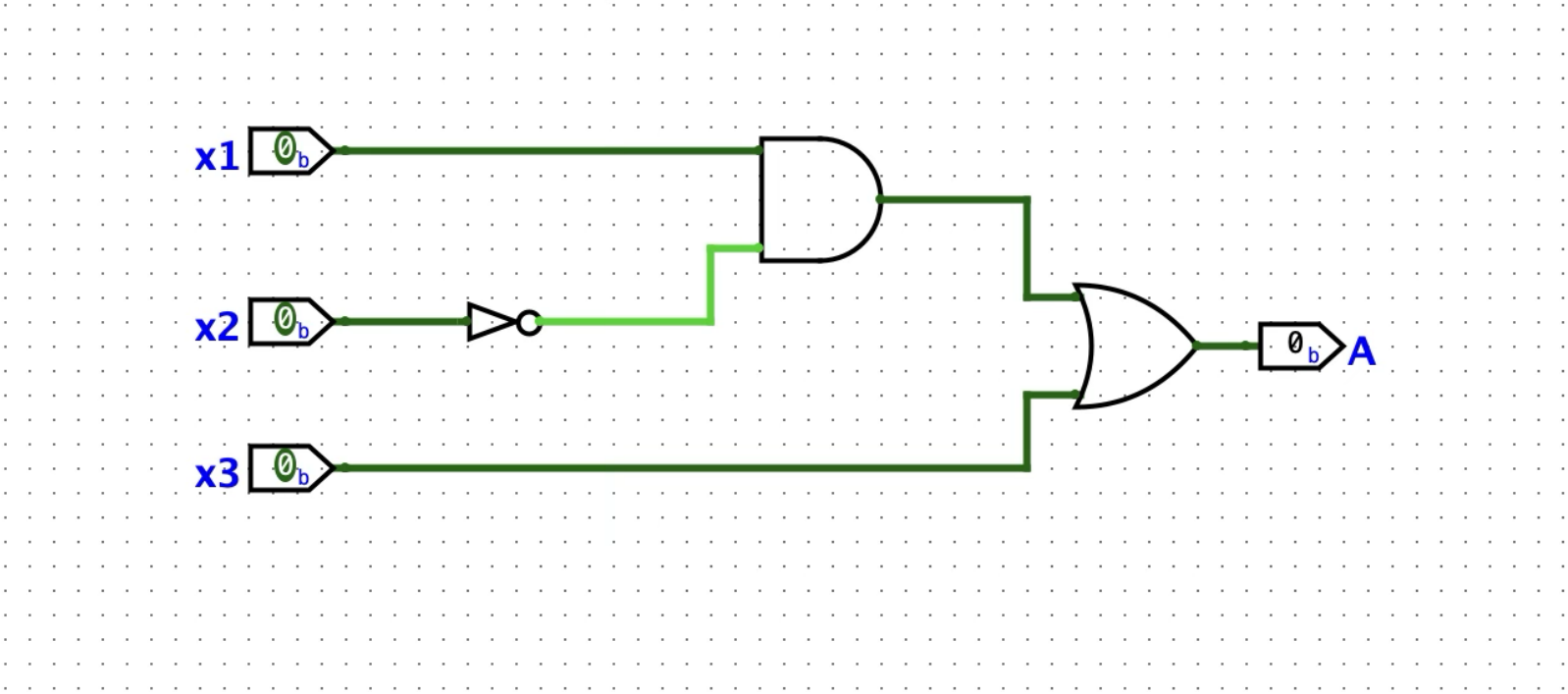
$$f(x_1, x_2, x_3) = A = (x_1 \cdot \overline{x_2}) \vee x_3$$

- Zapišite izhod logičnega vezja (A) s pomočjo pravilnostne tabele
- Narišite vezje v Logisimu
- Vezje realizirajte na testni pološči

Načrtovanje in simulacija digitalnih vezij

- Logisim-evolution

  https://github.com/logisim-evolution/logisim-evolution



Testna plošča (ang. breadboard)

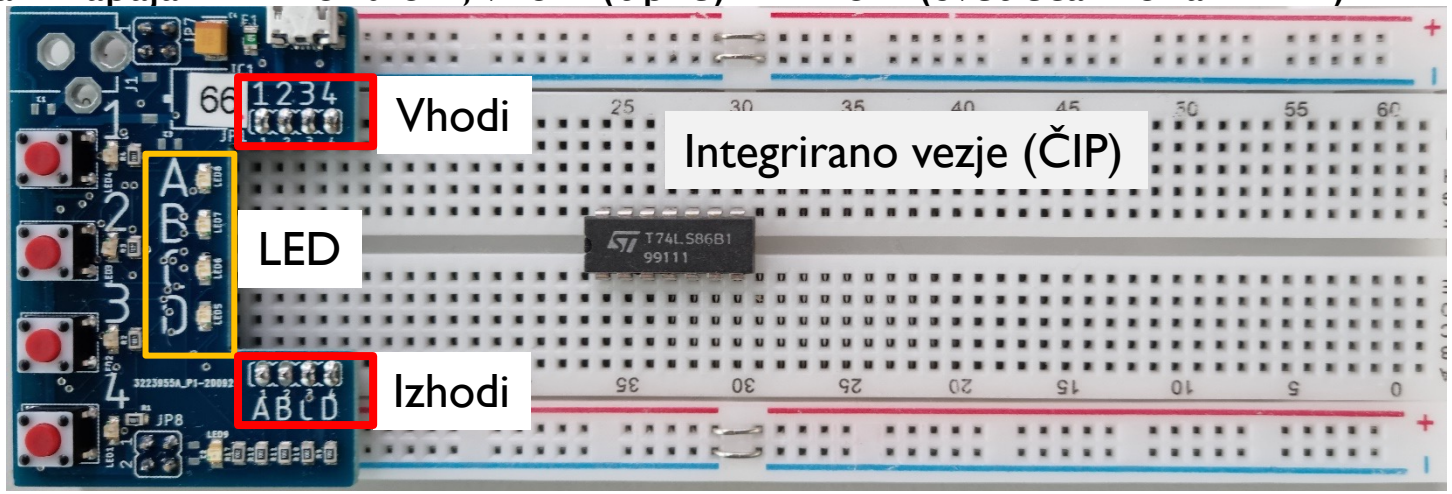
- Oprema I

  USB napajalnik (5V)



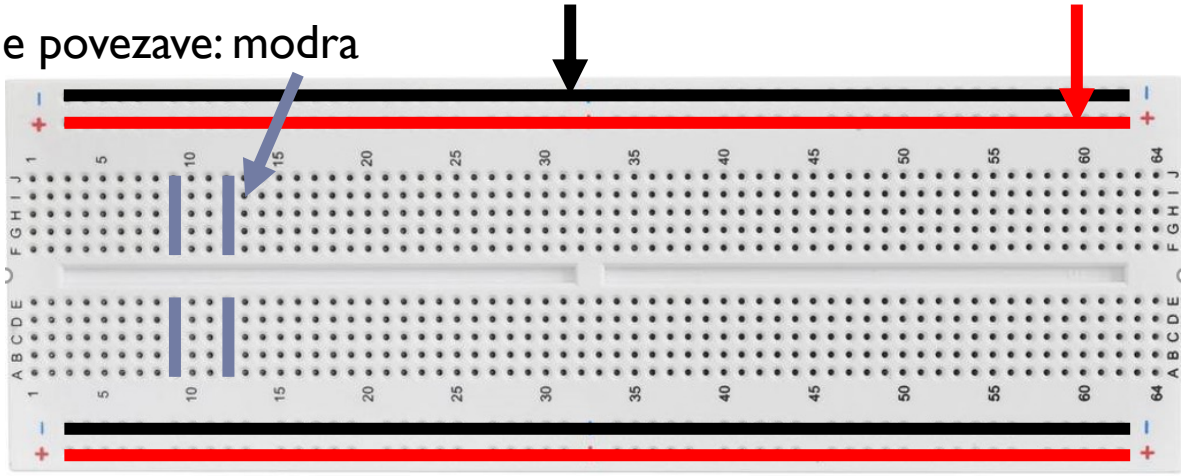


Testna plošča z napajalnim modulom, vhodi (tipke) in izhodi (svetleča dioda - LED)

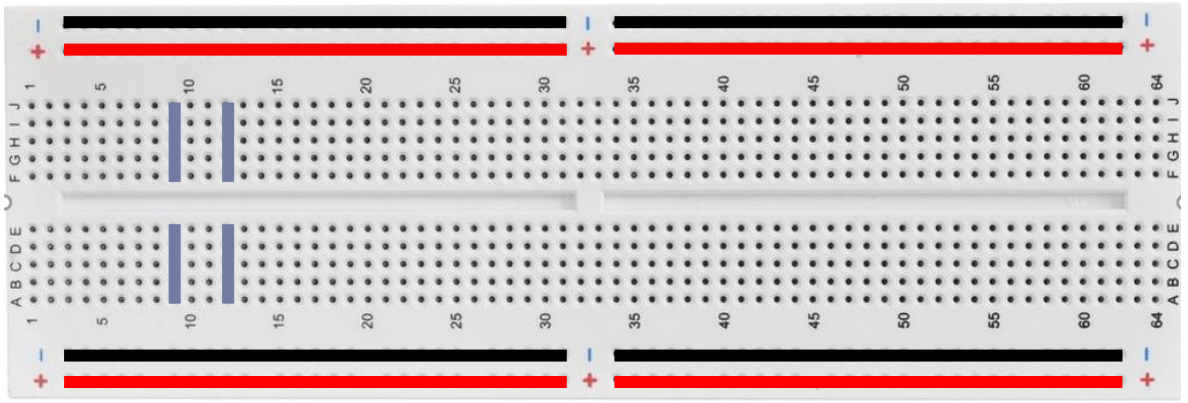


Testna plošča (ang. breadboard)

- Povezave na testni plošči:
  - Vzdolžne povezave: Gnd (masa) – črna (|), Vcc (napajanje) - rdeča (+)
  - Prečne povezave: modra



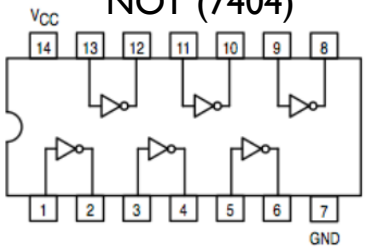
ali



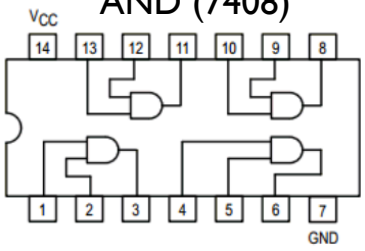
Realizacija vezja

- Čipi iz družine 7400

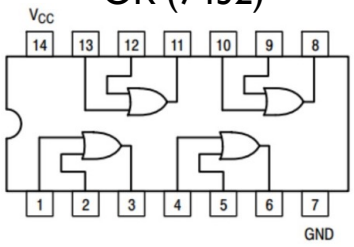
NOT (7404)

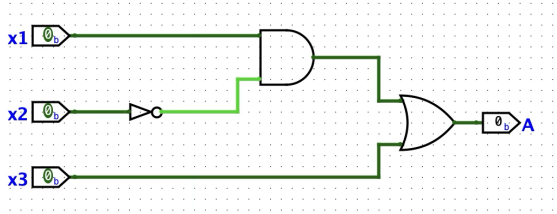


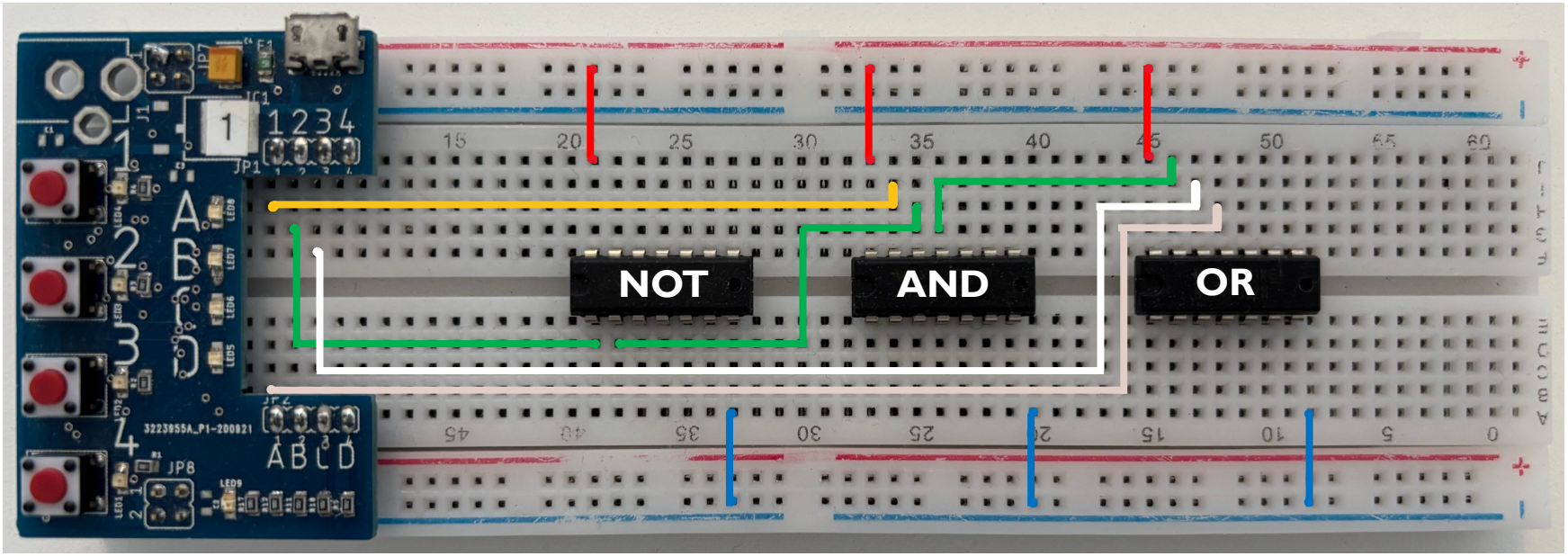
AND (7408)



OR (7432)

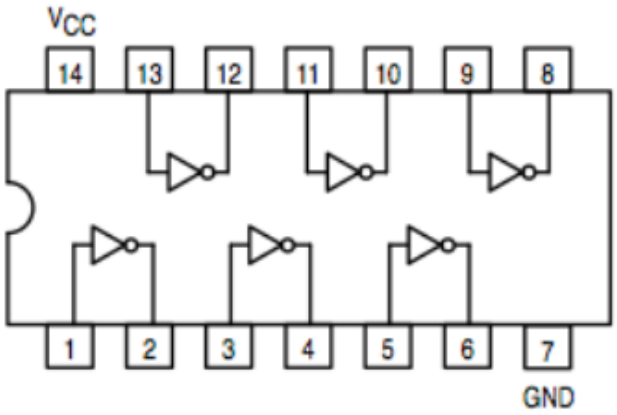




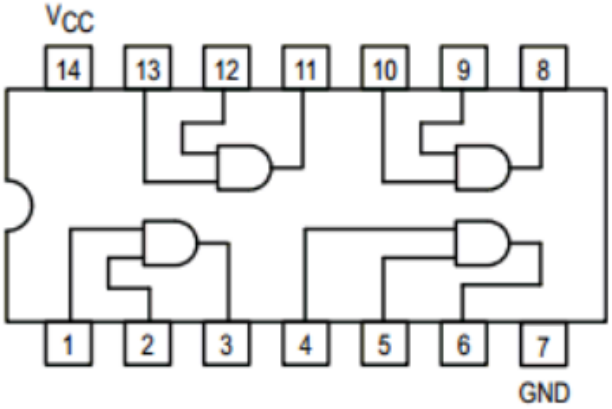


Čipi

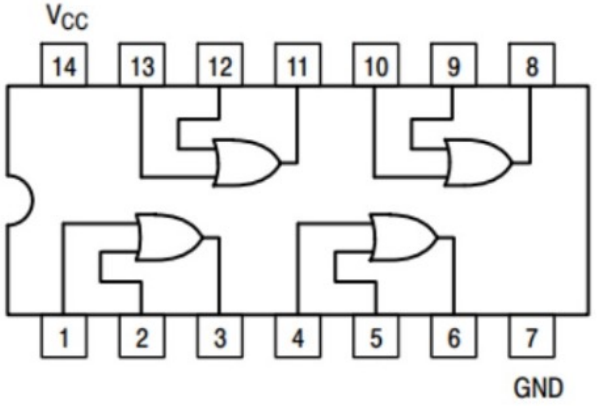
NOT (7404)



AND (7408)



OR (7432)



AND (4081)

