

## Vježbe III

### Bulova algebra

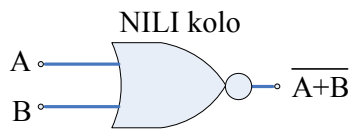
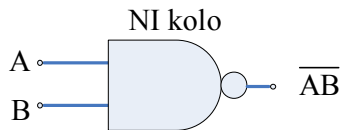
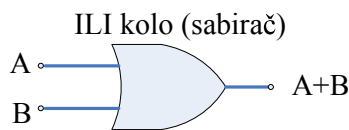
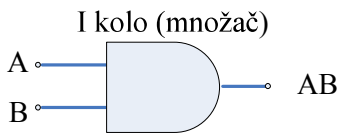
$$\begin{array}{ll} A + 0 = A & A \times 0 = 0 \\ A + 1 = 1 & A \times 1 = A \\ A + A = A & A \times A = A \\ A + \bar{A} = 1 & A \times \bar{A} = 0 \end{array}$$

$$\overline{\overline{A}} = A$$

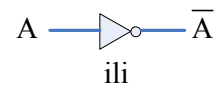
### De Morganova teorema

$$\begin{array}{l} \overline{A+B} = \bar{A} \times \bar{B} \\ \overline{A \times B} = \bar{A} + \bar{B} \end{array}$$

### Logički elementi



### INVERTOR



ili



\*\*\*napomena\*\*\*

Oznake za inverter su ekvivalentne i mogu se ravnopravno koristiti

1. Koristeći pravila Bulove algebre uprostiti izraze:

a)  $AB + \bar{A}B$       b)  $A + B + \bar{A}\bar{B}$       c)  $\bar{A}\bar{C} \times \bar{A}BC$       d)  $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$

a)  $AB + \bar{A}B = B(A + \bar{A}) = B$

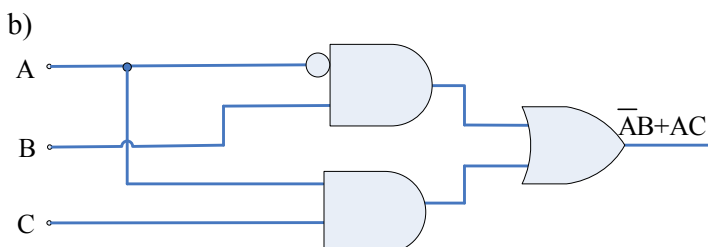
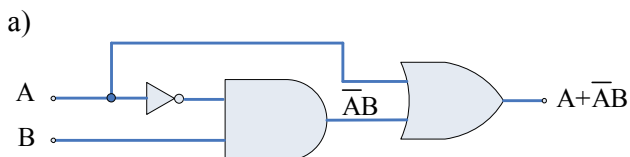
b)  $A + B + \bar{A}\bar{B} = A + B + \overline{A+B} = 1$

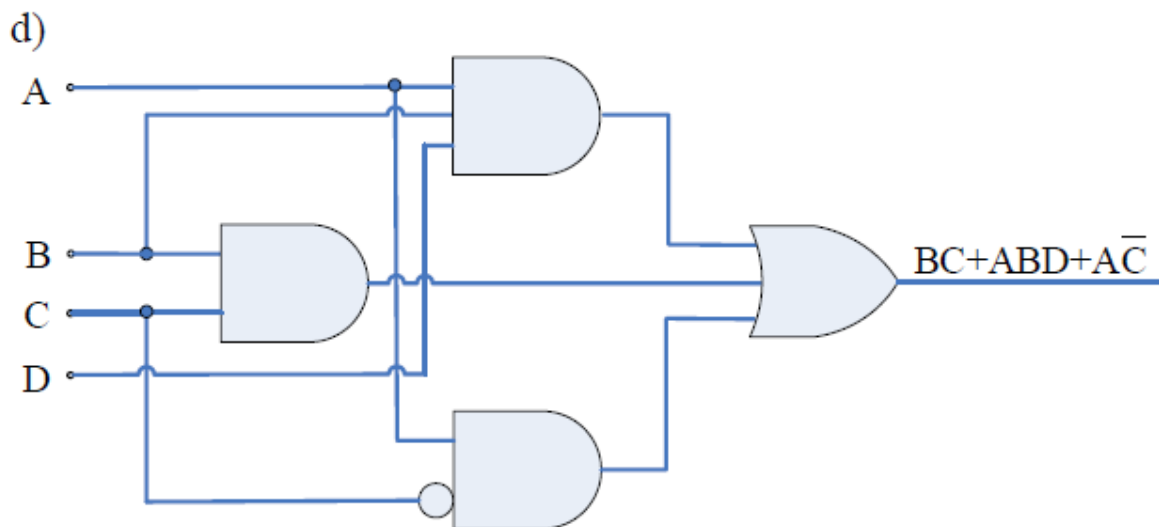
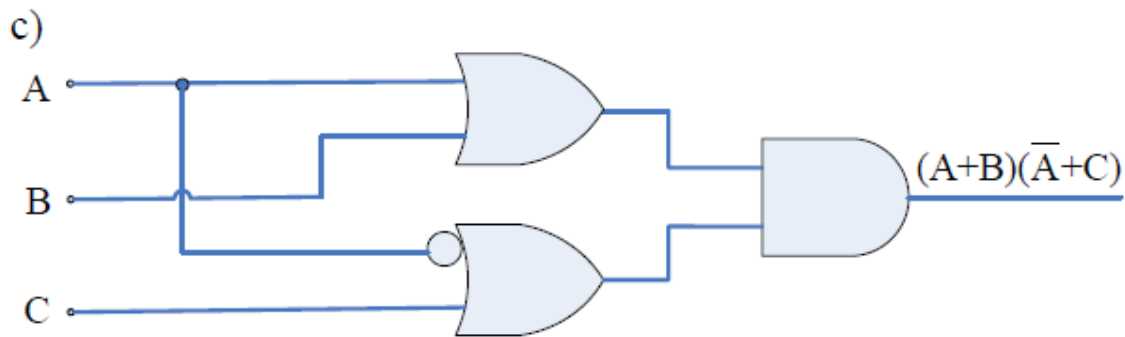
c)  $\bar{A}\bar{C} \times \bar{A}BC = (\bar{A} + \bar{C}) \times (A + \bar{B} + \bar{C}) = \bar{A}A + \bar{A}\bar{B} + \bar{A}\bar{C} + A\bar{C} + \bar{C}\bar{B} + \bar{C}\bar{C} = \bar{A}\bar{B} + \bar{A}\bar{C} + A\bar{C} + \bar{C}\bar{B} + \bar{C} = \bar{A}\bar{B} + \bar{C}(\bar{A} + A + \bar{B} + 1) = \bar{A}\bar{B} + \bar{C}$

d)  $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC = \bar{A}\bar{B}(C + \bar{C}) + AB(C + \bar{C}) = \bar{A}\bar{B} + AB = A(\bar{B} + B) = A$

2. Nacrtati šeme realizacije izraza:

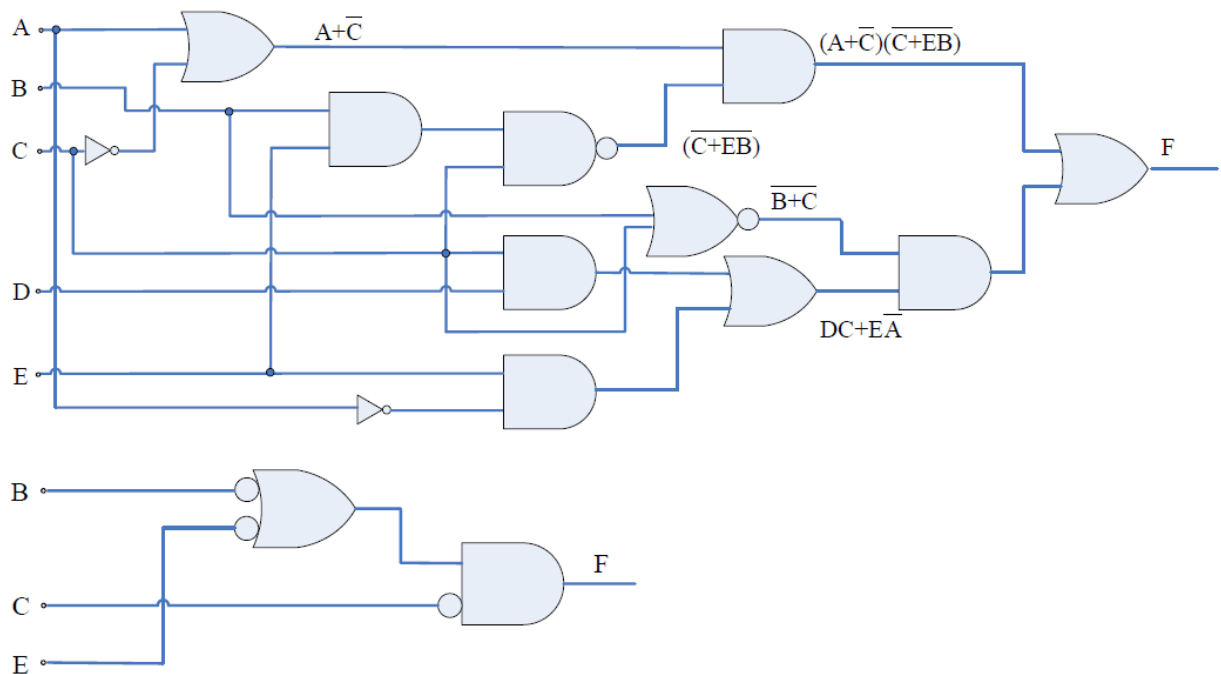
a)  $A + \bar{A}B$       b)  $\bar{A}B + AC$       c)  $(A+B)(\bar{A}+C)$       d)  $BC + ABD + A\bar{C}$





3. Uprostiti, a zatim realizovati originalnu i uporšćenu funkciju.

$$\begin{aligned}
 F &= (A + \bar{C})(\overline{C + EB}) + (DC + E\bar{A})(\overline{B + C}) = (A + \bar{C})\bar{C}\bar{E}\bar{B} + (DC + E\bar{A})\bar{B}\bar{C} = (A + \bar{C})\bar{C}(\bar{E} + \bar{B}) + DC\bar{B}\bar{C} + E\bar{A}\bar{B}\bar{C} \\
 &= (\bar{A}\bar{C} + \bar{C}\bar{C})(\bar{E} + \bar{B}) + E\bar{A}\bar{B}\bar{C} = (\bar{A}\bar{C} + \bar{C})(\bar{E} + \bar{B}) + E\bar{A}\bar{B}\bar{C} = \bar{C}(A + 1)(\bar{E} + \bar{B}) + E\bar{A}\bar{B}\bar{C} = \bar{C}(\bar{E} + \bar{B}) + E\bar{A}\bar{B}\bar{C} \\
 &= \bar{C}\bar{E} + \bar{C}\bar{B} + E\bar{A}\bar{B}\bar{C} = \bar{C}\bar{E} + \bar{C}\bar{B}(1 + E\bar{A}) = \bar{C}\bar{E} + \bar{C}\bar{B} = \bar{C}(\bar{E} + \bar{B})
 \end{aligned}$$



4. Koristeći pravila Bulove algebre dokazati identitet  $A \times \overline{AB} + B(\overline{A \times B}) = A$  i nacrtati obje šeme realizacije.

$$A \times \overline{AB} + B(\overline{A \times B}) = A \times (\overline{A} + \overline{B}) + B(A + \overline{B}) = A\overline{A} + A\overline{B} + AB + B\overline{B} = A(\overline{B} + B) = A$$

