Heimadæmi 2

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Verkefni 1

a)

X	Y	Z	-(X and Y and Z)	-X or -Y or -Z
1	1	1	0	0
1	1	0	1	1
1	0	1	1	1
1	0	0	1	1
0	1	1	1	1
0	1	0	1	1
0	0	1	1	1
0	0	0	1	1

X	Y	Z	-(X or Y or Z)	-X and -Y and -Z
1	1	1	0	0
1	1	0	0	0
1	0	1	0	0
1	0	0	0	0
0	1	1	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	1

b)

X	Y	Z	X or Y and Z	(X or Y) and (X or Z)
1	1	1	1	1
1	1	0	1	1
1	0	1	1	1
1	0	0	1	1
0	1	1	1	1
0	1	0	0	0
0	0	1	0	0
0	0	0	0	0

c)

X	Y	Z	X or (Y and Z)	(X or Y) and (X or Z)
1	1	1	1	1
1	1	0	1	1
1	0	1	1	1
1	0	0	1	1
0	1	1	1	1
0	1	0	0	0
0	0	1	0	0
0	0	0	0	0

d)

X	Y	Z	X and (Y and Z)	(X and Y) and Z
1	1	1	1	1
1	1	0	0	0
1	0	1	0	0
1	0	0	0	0
0	1	1	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	0	0

e)

X	Y	Z	X or (Y or Z)	(X or Y) or Z
1	1	1	1	1
1	1	0	1	1
1	0	1	1	1
1	0	0	1	1
0	1	1	1	1
0	1	0	1	1
0	0	1	1	1
0	0	0	0	0

Verkefni 2

a)

$$\overline{A}\,\overline{C}+ABC+A\overline{C}$$

Apply the Distributive Law: $AB+AC = AB+C$

$$\overline{C}(\overline{A}+A)+ABC$$

Apply the Complement Law: $A+\overline{A} = 1$

$$\overline{C}1+ABC$$

Apply the Identity Law: $A1 = A$

$$\overline{C}+ABC$$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$$\overline{C}+AB$$

b)

$$\overline{\overline{X}\,\overline{Y}+Z}+Z+XY+WZ$$

Apply: Demorgan Theorm

$$(\overline{\overline{X}}+\overline{\overline{Y}})\overline{Z}+Z+XY+WZ$$

Apply the Involution Law: $\overline{\overline{A}} = A$

$$(X+\overline{\overline{Y}})\overline{Z}+Z+XY+WZ$$

Apply the Involution Law: $\overline{\overline{A}} = A$

$$(X+Y)\overline{Z}+Z+XY+WZ$$

Apply the Absorption Law: $A+AB = A$

$$(X+Y)\overline{Z}+Z+XY$$

Apply the Absorption Law: $\overline{A}B+A = B+A$

$$X+Y+Z+XY$$

Apply the Absorption Law: $A+AB = A$

$$X+Y+Z$$

c)

$\overline{A}B(\overline{D}+\overline{C}D)+B(A+\overline{A}CD)$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$\overline{A}B(\overline{D}+\overline{C})+B(A+\overline{A}CD)$

Apply: Distribution

$\overline{A}B\overline{D}+\overline{A}B\overline{C}+B(A+\overline{A}CD)$

Apply: Distribution

$\overline{A}B\overline{D}+\overline{A}B\overline{C}+BA+B\overline{A}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$B(\overline{A}\overline{D}+A)+\overline{A}B\overline{C}+B\overline{A}CD$

Apply the Absorption Law: $\overline{A}B+A = B+A$

$B(\overline{D}+A)+\overline{A}B\overline{C}+B\overline{A}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$B(\overline{D}+A)+B\overline{A}(CD+\overline{C})$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$B(\overline{D}+A)+B\overline{A}(D+\overline{C})$

Apply: Distribution

$B\overline{D}+BA+B\overline{A}(D+\overline{C})$

Apply the Distributive Law: $AB+AC = AB+C$

$B\overline{D}+B(\overline{A}(D+\overline{C})+A)$

Apply the Absorption Law: $\overline{A}B+A = B+A$

$B\overline{D}+B(D+\overline{C}+A)$

Apply: Distribution

$B\overline{D}+BD+B\overline{C}+BA$

Apply the Distributive Law: $AB+AC = AB+C$

$B(\overline{D}+D)+B\overline{C}+BA$

Apply the Complement Law: $A+\overline{A} = 1$

$B1+B\overline{C}+BA$

Apply the Identity Law: $A1 = A$

$B+B\overline{C}+BA$

Apply the Absorption Law: $A+AB = A$

$B+BA$

Apply the Absorption Law: $A+AB = A$

B

d) ABC'D+A'BD+ABCD=ABD+A'BD=BD

Verkefni 3

a) A AND B = 1010 0000

b) A OR B = 1011 1101

c) A XOR B = 0001 1101

d) NOT A = 0100 1110

e) NOT B = 0101 0011

Verkefni 4

a) $\sum(3,5,6,7), \prod(0,1,2,4)$

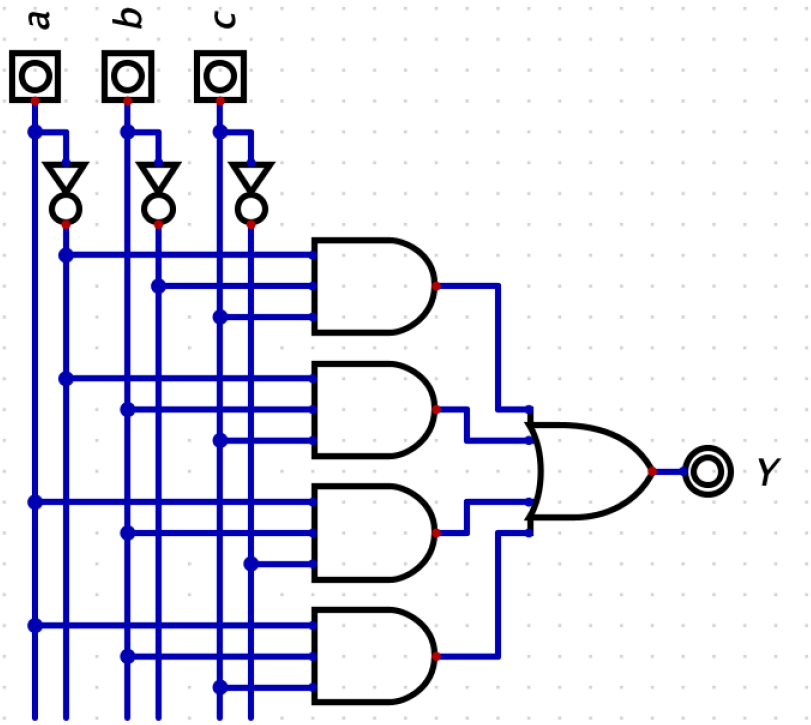
b) $\sum(3,4,6,7), \prod(0,1,2,5)$

c) $\sum(0,1,4,5,7), \prod(2,3,6)$

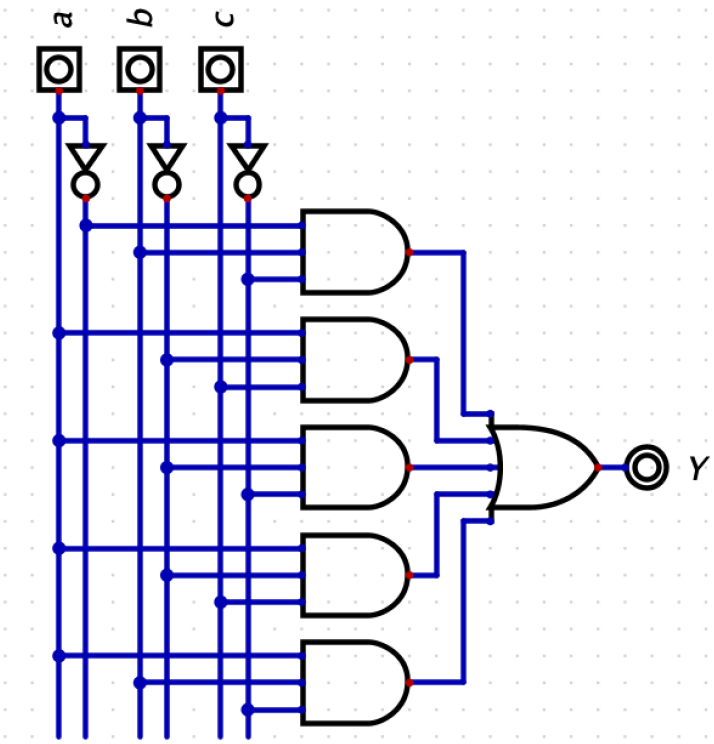
d) $\sum(0,1,4,5,6,10,11,12,14), \prod(2,3,7,8,9,13,15)$

Verkefni 5

- a′b′c+a′bc+abc′+abc

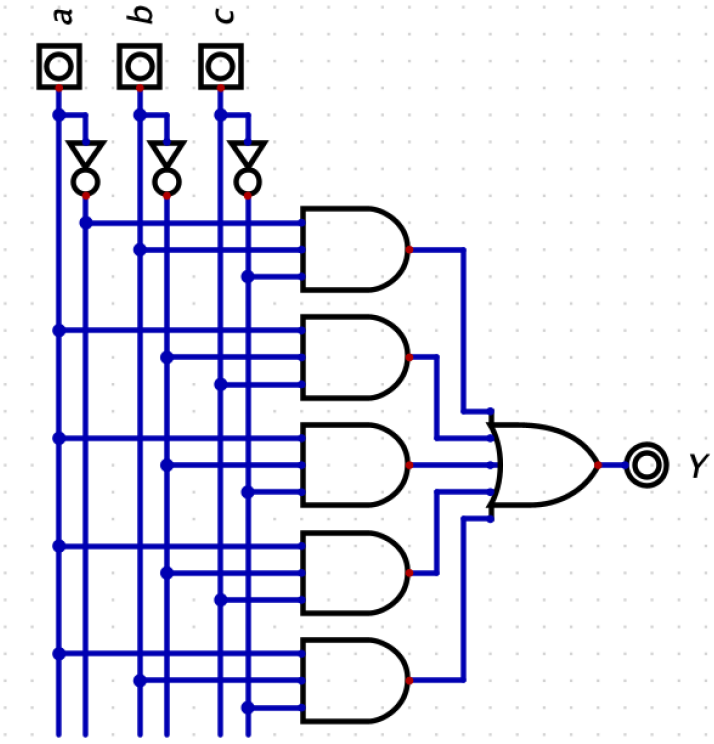


- a′bc′+a′bc+ab′c′+ab′c+abc′

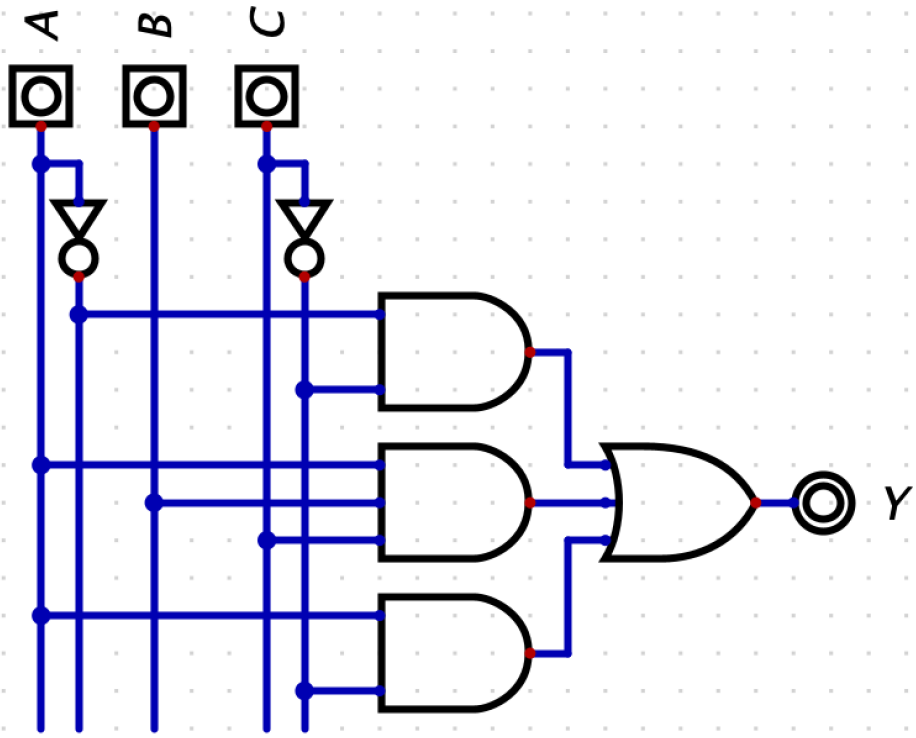


Verkefni 6

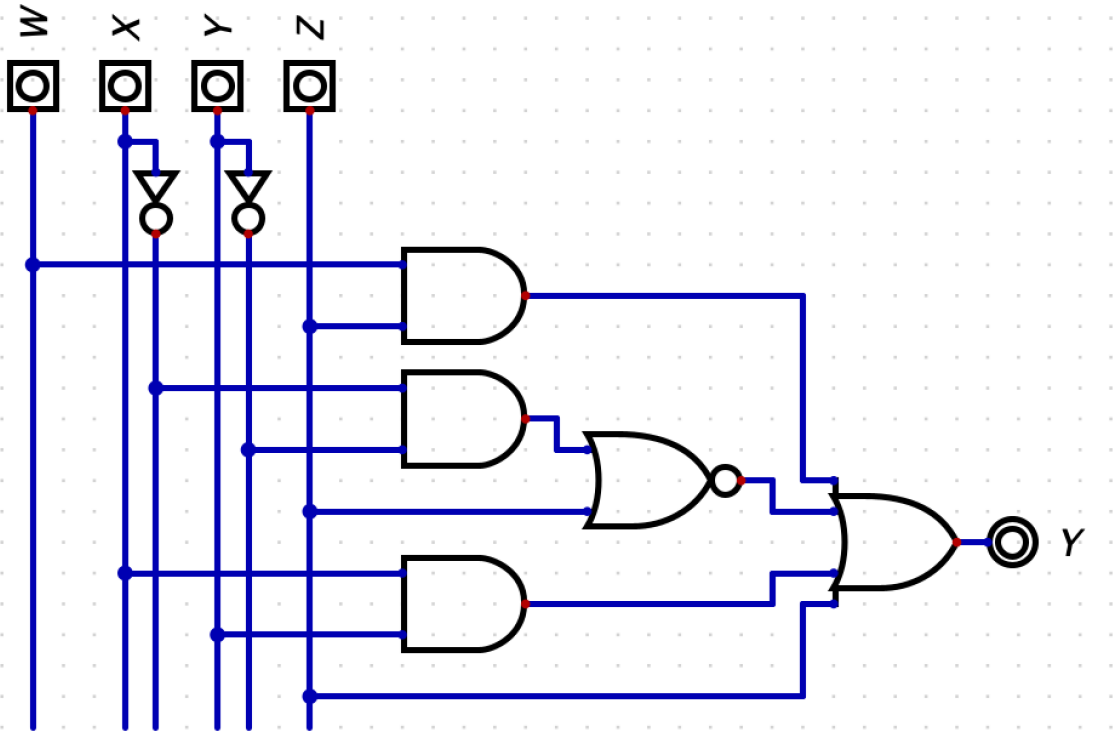
a)



b)



c)



d)