

Logic practicum A

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A1: IEEE-754 floating point standaard voor enkelvoudige precisie.

Converteer op papier de volgende twee decimale getallen naar floating point enkelvoudige precisie. Gebruik daarbij het stappenplan zoals is uitgelegd in hoorcollege 1.

1. 8,5

2. $-12\frac{11}{16}$

1.

$$8,5 = 1.000100 \cdot 2^3$$

8	4	2	1	1/2	1/4	1/8
1	0	0	0	1	0	0

Exponent

$$127 + 3 = 130$$

Delen	Resultaat	Overblijfsel
130/2	65	0
65/2	32	1
32/2	16	0
16/2	8	0
8/2	4	0
4/2	2	0
2/1	1	0
1/2	0	1

$130 = 10000010$

Mantissa

$8,5 = 1.000100 \cdot 2^3$

Mantissa = 000100

Binair

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0

21	22	23	24	25	26	27	28	29	30	31	32
0	0	0	0	0	0	0	0	0	0	0	0

$8,5 = 01000001000010000000000000000000_2$

2.

$-12\frac{11}{16} = 1100.1011$

8	4	2	1	1/2	1/4	1/8	1/16
1	1	0	0	1	0	1	1

Exponent

$-12\frac{11}{16} = 1.1001011 \cdot 2^3$

$127 + 3 = 130$

Delen	Resultaat	Overblijfsel
130/2	65	0
65/2	32	1
32/2	16	0
16/2	8	0
8/2	4	0
4/2	2	0
2/1	1	0
1/2	0	1

$130 = 10000010$

Mantissa

$-12\frac{11}{16} = 1.1001011 \cdot 2^4$

Mantissa = 1001011

Binair

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	0	0	0	0	0	1	0	1	0	0	1	0	1	1	0	0	0	0

21	22	23	24	25	26	27	28	29	30	31	32
0	0	0	0	0	0	0	0	0	0	0	0

$$12\frac{11}{16} = 11000001010010110000000000000000_2$$

Converteer de volgende floating point enkelvoudige precisie codes naar een decimaal getal geschreven als breuk. Gebruik daarbij het stappenplan zoals is uitgelegd in hoorcollege 1.

$$1. 0 \times 41A60000$$

$$2. 0 \times C16A0000$$

1.

$$0 \times 41A60000$$

$$1. 0100\ 0001\ 1010\ 0110\ 0000\ 0000\ 0000\ 0000$$

$$2. \text{Sign} = 0, \text{ dus positief}$$

$$3. \text{Exponent} = 1000\ 0011 = 131 - 127 = 4$$

$$4. \text{Breuk} = 0100\ 0011 = 1.010011$$

$$5. 1.010011 \cdot 2^4 = 10100.11 = 20\frac{3}{4}$$

2.

$$0 \times C16A0000$$

$$1. 1100\ 0001\ 0110\ 1010\ 0000\ 0000\ 0000\ 0000$$

$$2. \text{Sign} = 1, \text{ dus negatief}$$

$$3. \text{Exponent} = 1000\ 0010 = 130 - 127 = 3$$

$$4. \text{Breuk} = 1101\ 0100 = 1.11010100$$

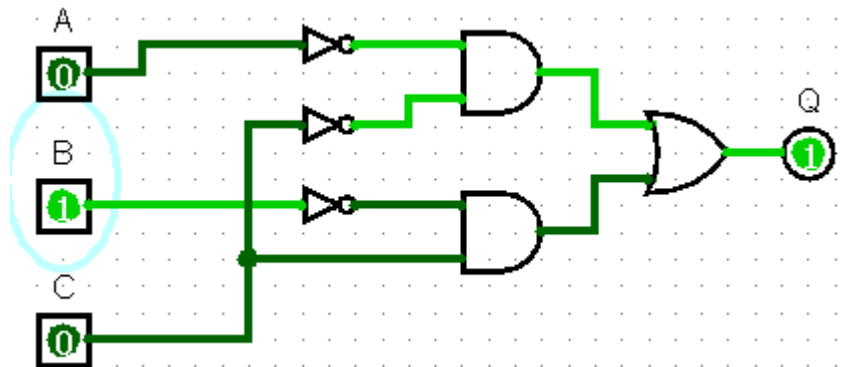
$$5. 1.11010100 \cdot 2^4 = 1110.10100 = 14\frac{5}{8}$$

A2: Circuit minimaliseren I.

A	B	C	Q
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

$$1. Q = \bar{a} \cdot \bar{b} \cdot \bar{c} + \bar{a} \cdot \bar{b} \cdot c + \bar{a} \cdot b \cdot \bar{c} + a \cdot \bar{b} \cdot c$$

2. Na simulatie volgt dit circuit



$$3. K[Q] = [3 + 3 + 3 + 3] + 4 = 16$$

4. Zie tabel

$CD \backslash AB$	00	01	11	10
0	1	1	0	1
1	0	1	0	0

001

101

-10 is $\bar{b} \cdot c$

000

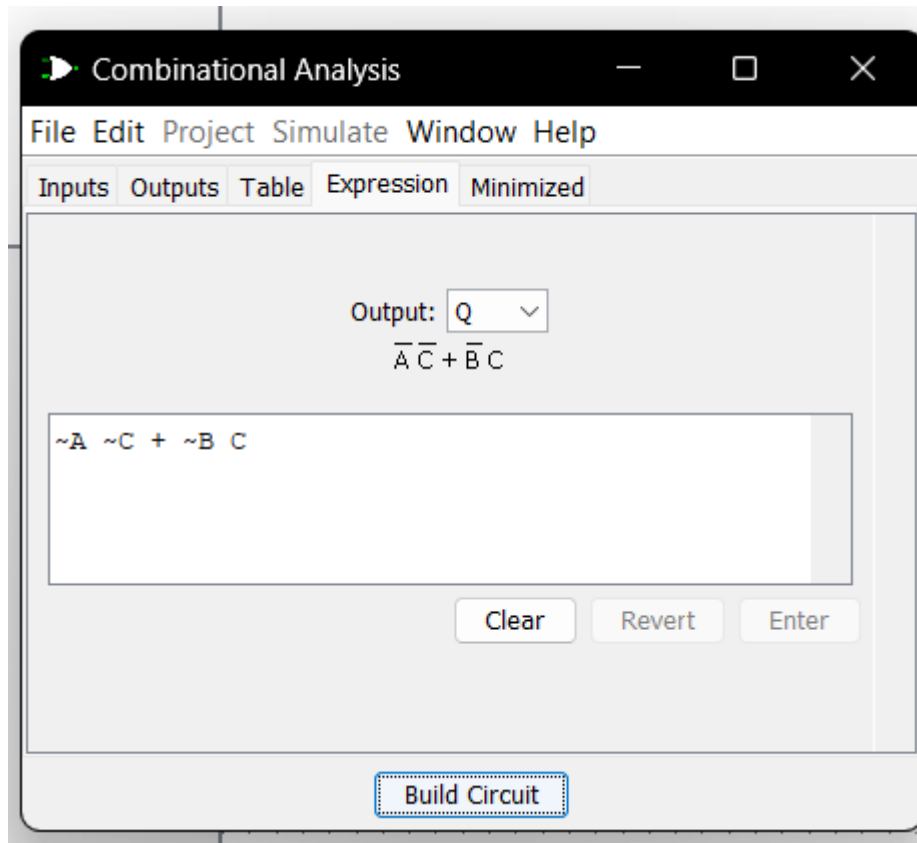
010

0-0 is $\bar{a} \cdot \bar{c}$

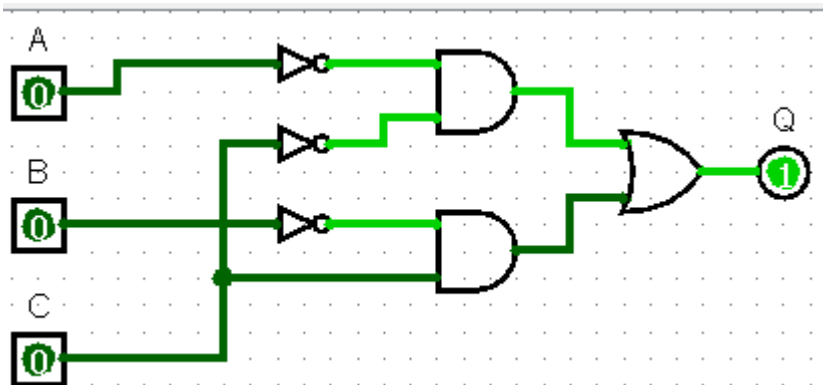
$$Q' = \bar{b} \cdot c + \bar{a} \cdot \bar{c}$$

$$5. k[Q'] = [2 + 2] + 2 = 6$$

6. Formule



Circuit



A3: Circuit minimaliseren II.

A	B	C	D	Q
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1

A	B	C	D	Q
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

- $Q = \bar{a} \cdot \bar{b} \cdot \bar{c} \cdot d + \bar{a} \cdot b \cdot \bar{c} \cdot d + a \cdot \bar{b} \cdot \bar{c} \cdot \bar{d} + a \cdot \bar{b} \cdot \bar{c} \cdot d + a \cdot b \cdot \bar{c} \cdot \bar{d}$
- $K[Q] = [4 + 4 + 4 + 4 + 4 + 4] + 6 = 30$
- Zie tabel

<i>CD</i> <i>AB</i>	00	01	11	10
00	0	1	0	0
01	0	1	0	0
11	1	1	0	0
10	1	1	0	0

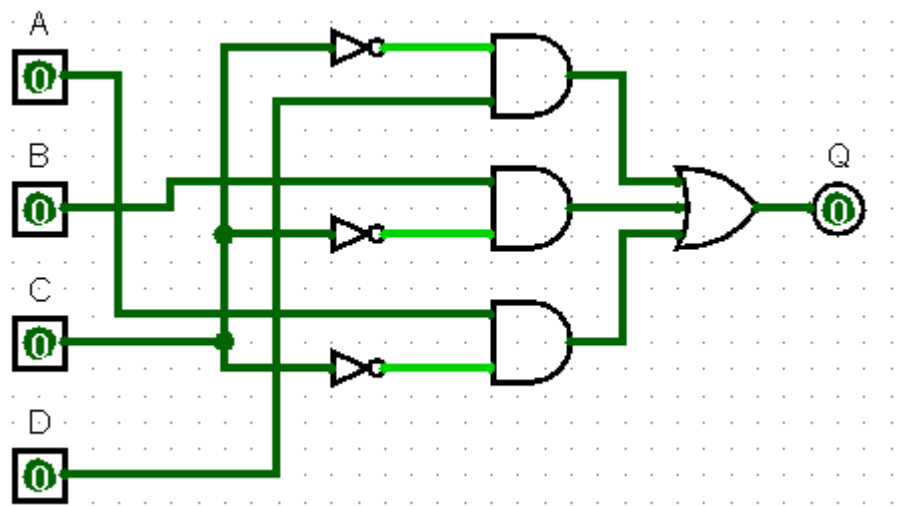
1100
1000
1101
1001

1-0- is $a \cdot \bar{c}$
0101
0001
1101
1001

--01 is $\bar{c} \cdot d$
 $Q' = a \cdot \bar{c} + \bar{c} \cdot d$

- $k[Q'] = [2 + 2] + 2 = 6$

6. Circuit



7. Formule

Format: Sum of products

		C, D			
		00	01	11	10
A, B	00	0	1	0	0
	01	1	1	0	0
	11	1	1	0	0
	10	1	1	0	0

$\bar{C}D + B\bar{C} + A\bar{C}$

Zoals je in in het circuit ziet komen de not en de and gates overeen met de vergelijking