



## Digital Systems Wintersemester 2017/2018

### Serie 4

Issue date: Monday, 20.11.2017

Submission date: Monday, 4.12.2017, 8 a.m.

### Presentation tasks

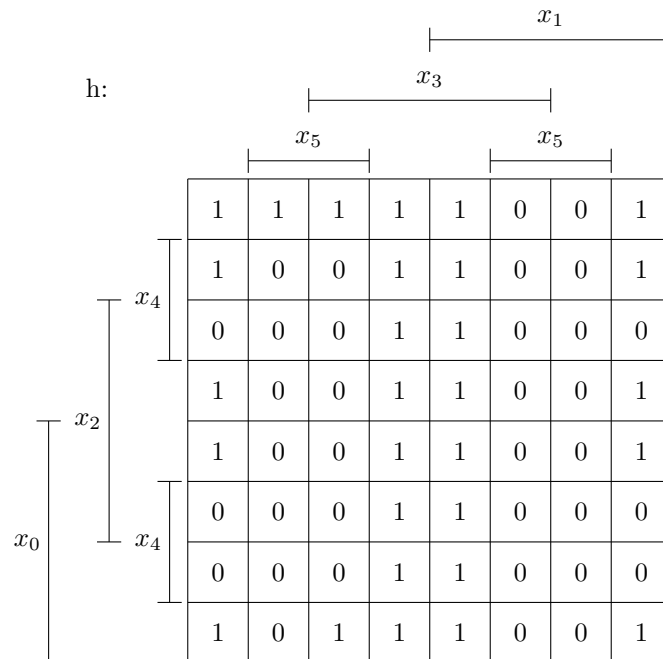
#### Task 1

Minimize the following function  $f_1$  using the Quine and McCluskey method:

$$f_1 = \bar{a}\bar{b}\bar{c}\bar{d} + \bar{a}\bar{b}c\bar{d} + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + \bar{a}bc\bar{d} + \bar{a}bcd + a\bar{b}\bar{c}\bar{d} + a\bar{b}c\bar{d} + ab\bar{c}\bar{d} + abcd$$

#### Task 2

Minimize the disjunctive and the conjunctive normal form of the Boolean function given by the Karnaugh map  $h$  below. Do not forget to mark the joints you make.



# Homework

## Task 1

Minimize the CDNF and CCNF of the Boolean functions given by the Karnaugh maps below.

$f_1$ :

		-----  $x_1$			
		-----  $x_3$			
		0	0	1	1
		1	1	0	0
	-----  $x_2$	1	1	0	0
-----  $x_0$		0	0	0	1

$f_2$ :

		-----  $x_1$			
		-----  $x_3$			
		0	1	1	1
		0	0	0	0
	-----  $x_2$	1	0	0	1
-----  $x_0$		1	0	0	1

$f_3$ :

		-----  $x_1$			
		-----  $x_3$			
		0	1	0	0
		1	1	1	1
	-----  $x_2$	1	0	0	0
-----  $x_0$		1	1	0	0

$f_4$ :

		-----  $x_1$			
		-----  $x_3$			
		1	0	0	1
		0	1	1	0
	-----  $x_2$	0	1	1	1
-----  $x_0$		1	0	0	1

40 points, 10 points each

## Task 2

Minimize the following function  $f_1$  using the Quine and McCluskey method:

$$f_1 = abcd + a\bar{b}\bar{c}\bar{d} + \bar{a}\bar{b}cd + a\bar{b}\bar{c}d + \bar{a}bcd + a\bar{b}c\bar{d} + \bar{a}b\bar{c}d + \bar{a}\bar{b}\bar{c}d + ab\bar{c}d + \bar{a}\bar{b}\bar{c}\bar{d}$$

30 points

## Task 3

Minimize the disjunctive and the conjunctive normal form of the Boolean function given by the Karnaugh map  $h$  below. Do not forget to mark the joints you make, preferably in color.

h:

					$x_1$					
				$x_3$						
			$x_5$			$x_5$				
			0	1	0	0	0	0	1	0
		$x_4$	0	1	1	0	1	1	1	0
			0	1	1	0	0	1	1	1
			1	0	1	0	1	1	0	1
	$x_2$		0	0	1	0	0	1	0	1
			0	1	1	0	0	1	1	0
		$x_4$	1	1	1	1	1	1	1	0
$x_0$			0	1	1	0	0	0	0	1

30 points