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Introduction to Computer Science, Winter Semester 2017
Practice Assignment 10

Discussion: 30.12.2017 - 4.1.2018

Exercise 10-1 To be Discussed in Tutorial

Given the following truth table, where P, X, and Y are the input variables and S and C are the output variables:

P	X	Y	S	C
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Use the sum-of-products-algorithm to determine the Boolean expressions that correspond to the truth table.

Exercise 10-2

Using truth tables, show that:

$X'Y + Y'Z + XZ' = XY' + YZ' + X'Z$

Exercise 10-3

A circuit should be designed to perform the modulus operation of two numbers consisting of two bits each.

Assume that for any number N, $N\%0 = 3$.

a) How many input and output variables are needed?

b) Construct the truth table for this circuit

c) Using the sum-of-products method, find the Boolean expressions that correspond to the constructed truth table.

Exercise 10-4 To be Discussed in Tutorial

Given the following truth tables, find the functionality of the designated circuits.

a)

A	B	C	O1
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

b)

A1	A0	B1	B0	O1	O2	O3
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	1	0
0	0	1	1	0	1	1
0	1	0	0	0	0	1
0	1	0	1	0	1	0
0	1	1	0	0	1	1
0	1	1	1	1	0	0
1	0	0	0	0	1	0
1	0	0	1	0	1	1
1	0	1	0	1	0	0
1	0	1	1	1	0	1
1	1	0	0	0	1	1
1	1	0	1	1	0	0
1	1	1	0	1	0	1
1	1	1	1	1	1	0

Hint: A1A0 and B1B0 are both two numbers consisting of 2 bits each

c)

A	B	C	D	O1
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1