Advanced Logic Design 2012
Assignment 5, 8 points, due 29/11

(1) **1 point** Compute the Reed-Muller canonical form for the Boolean function shown below. Write the result as a Reed-Muller canonical expression.

(a) $f(x_1,x_2,x_3) = x_1'x_2 + x_2x_3 + x_2'x_3'$

(b) $f(x_1,x_2,x_3) = x_1'x_2' + x_1'x_3 + x_2x_3'$

(2) **1 point** Draw Karnaugh maps for the Boolean functions represented by the following Reed-Muller canonical expressions:

(a) $f(x_1,x_2,x_3) = x_1 \oplus x_1x_2 \oplus x_1x_2x_3$

(b) $f(x_1,x_2,x_3) = x_1x_2 \oplus x_1x_3 \oplus x_1x_2x_3$

(3) **4 points** Draw composition trees for Boolean functions from task 2.

(4) **2 points** Express the following functions of type $f : \{0,1,2,3\}^2 \to \{0,1,2,3\}$ in the sum-of-product form over Post algebra. Use "$\cdot$" for MIN and "$+$" for MAX. You can use either regular literals, or set-literals.

(a)

$x_2 \backslash x_1$	0	1	2	3
0	0	1	0	0
1	0	2	0	0
2	2	3	2	2
3	0	1	0	0

(b)

$x_2 \backslash x_1$	0	1	2	3
0	0	1	3	3
1	2	2	3	3
2	0	1	0	2
3	1	1	2	1