

EECS 478 Hw4  
Cheng-Fu Lin

P3

caen-vnc01% ./abc

UC Berkeley, ABC 1.01 (compiled Mar 20 2013 23:44:40)

abc 01> read\_pla M33.pla

abc 02> espresso

abc 03> write\_pla M33\_SOP.pla

abc 03> quit

Input file

.i 6

.o 6

.ilb a2 a1 a0 b2 b1 b0

.ob p5 p4 p3 p2 p1 p0

000000 000000

000001 000000

000010 000000

000011 000000

000100 000000

000101 000000

000110 000000

000111 000000

001000 000000

001001 000001

001010 000010

001011 000011

001100 000100

001101 000101

001110 000110

001111 000111

010000 000000

010001 000010

010010 000100

010011 000110

010100 001000

010110 001100

010101 001010

010111 001110

011000 000000

011001 000011

011010 000110

011011 001001

011100 001100

011101 001111

011110 010010

011111 010101

100000 000000

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100001 000100
100010 001000
100011 001100
100100 010000
100101 010100
100110 011000
100111 011100
101000 000000
101001 000101
101010 001010
101011 001111
101100 010100
101101 011001
101110 011110
101111 100011
110000 000000
110001 000110
110010 001100
110011 010010
110100 011000
110101 011110
110110 100100
110111 101010
111000 000000
111001 000111
111010 001110
111011 010101
111100 011100
111101 100011
111110 101010
111111 110001
.e

```

Output file

# Equations for "M33" written by ABC on Wed Mar 20 23:54:19 2013

INORDER = a2 a1 a0 b2 b1 b0;

OUTORDER = p5 p4 p3 p2 p1 p0;

p5 = a2 \* b2 \* ((a1 \* (b1 + (a0 \* b0))) + (a0 \* b1 \* b0));

p4 = (b2 \* ((a1 \* a0 \* b1 \* (!a2 + b0)) + (a2 \* (((!a0 + !b0) \* (!a1 + !b1)) + (!a1 \* !b1))))) + (a2 \* a1 \* !b2 \* b1 \* b0);

p3 = (a1 \* ((b2 \* ((!a2 \* (!a0 + !b1)) + (!a0 \* b0) + (!b1 \* !b0))) + (!b2 \* b1 \* b0 \* !a2 \* a0))) + (a2 \* ((a0 \* ((!a1 \* b2 \* !b1 \* b0) + (b1 \* !b0))) + (b1 \* ((!a1 \* (!a0 + !b2)) + (!b2 \* !b0))));

p2 = (!a2 \* ((a1 \* !a0 \* b1) + (a0 \* b2 \* b0))) + (!b0 \* ((a1 \* b1 \* (!a0 + !b2)) + (a0 \* b2 \* (!a1 + !b1)))) + (a2 \* b0 \* ((!a0 \* (!a1 + !b1)) + (a0 \* !b2)));

p1 = (a1 \* b0 \* (!a0 + !b1)) + (a0 \* b1 \* (!a1 + !b0));

p0 = a0 \* b0;

# Benchmark "M33" written by ABC on Thu Mar 21 11:33:32 2013

.i 6

```
.o 6
.ilb a2 a1 a0 b2 b1 b0
.ob p5 p4 p3 p2 p1 p0
.p 35
11-11- 100000
1111-1 100000
1-1111 100000
-11111 010000
01111- 010000
11-011 010000
1--100 010000
1001-- 010000
10-1-0 010000
1-010- 010000
10-10- 010000
-1-100 001000
1-1-10 001000
-101-1 001000
100-1- 001000
011011 001000
01-10- 001000
10-01- 001000
101101 001000
1--010 001000
0101-- 001000
1-10-1 000100
0-11-1 000100
--1100 000100
-1-010 000100
010-1- 000100
100--1 000100
-10-10 000100
-011-0 000100
1-0-01 000100
--1-10 000010
-1--01 000010
-10--1 000010
-01-1- 000010
--1--1 000001
.e
```

```
P4
abc 01> read_pla M33.pla
abc 02> espresso
abc 03> strash
abc 04> rewrite -z
abc 05> refactor
abc 06> rewrite -z
abc 07> iresyn
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abc 08> print_stats
M33      : i/o =  6/ 6 lat =  0 and =  57 (exor = 1) lev =  7
abc 08> write_blif M33_Multi.blif
input file is the same with P3
output file
# Benchmark "M33" written by ABC on Thu Mar 21 10:41:25 2013
.model M33
.inputs a2 a1 a0 b2 b1 b0
.outputs p5 p4 p3 p2 p1 p0
.names a0 b0 p0
11 1
.names a1 b1 n13
11 1
.names p0 n13 n14
00 1
.names a1 b1 n15
00 1
.names n14 n15 n16
00 1
.names a2 b2 n17
11 1
.names n16 n17 p5
11 1
.names a2 n16 n19
10 1
.names a2 b0 n20
10 1
.names a0 b1 n21
11 1
.names a1 n21 n22
11 1
.names n20 n22 n23
01 1
.names n19 n23 n24
00 1
.names b2 n24 n25
10 1
.names a2 b0 n26
11 1
.names b2 n13 n27
01 1
.names n26 n27 n28
11 1
.names n25 n28 n29
00 1
.names a0 n20 n30
00 1
.names b1 n26 n31
00 1

```

.names n30 n31 n32  
00 1  
.names b2 n32 n33  
10 1  
.names b2 b0 n34  
01 1  
.names a2 n34 n35  
01 1  
.names n21 n35 n36  
11 1  
.names n33 n36 n37  
00 1  
.names a1 n37 n38  
10 1  
.names b0 n15 n39  
10 1  
.names b2 b0 n40  
11 1  
.names b1 n40 n41  
00 1  
.names a0 n41 n42  
10 1  
.names n39 n42 n43  
01 1  
.names a1 a0 n44  
00 1  
.names b2 n44 n45  
10 1  
.names a1 b0 n46  
11 1  
.names b1 n46 n47  
10 1  
.names n45 n47 n48  
01 1  
.names n43 n48 n49  
00 1  
.names a2 n49 n50  
10 1  
.names n38 n50 n51  
00 1  
.names a0 b2 n52  
11 1  
.names n13 n52 n53  
11 1  
.names n13 n52 n54  
00 1  
.names b0 n54 n55  
00 1  
.names n53 n55 n56

01 1  
.names a0 n40 n57  
10 1  
.names a0 n13 n58  
00 1  
.names a2 n58 n59  
00 1  
.names n57 n59 n60  
01 1  
.names a0 n13 n61  
01 1  
.names n26 n52 n62  
10 1  
.names n61 n62 n63  
01 1  
.names n60 n63 n64  
00 1  
.names n56 n64 n65  
01 1  
.names n21 n46 n66  
01 1  
.names n21 n46 n67  
10 1  
.names n66 n67 n68  
00 1  
.names n29 p4  
0 1  
.names n51 p3  
0 1  
.names n65 p2  
0 1  
.names n68 p1  
0 1  
.end