디지털 공학 (MEC520)
Midterm Examination

Spring, 2009

1. Perform the following subtraction using the 2's compliment after converting the decimal numbers to binary numbers. (10 pt)

   36 – 63.6875

2. Reduce the following Boolean expression to the indicated number of literals. (10 pt each)
   a) $(x'y'+z)'+z+xy+wz$ to three literals
   b) $A'C'+ABC+A'C'$ to three literals

3. Simplify the following functions in product of sums. (10 pt each)
   a) $F(w,x,y,z)=\sum(0,2,5,7,8,10)$
   b) $F(A,B,C,D)=\prod(1,3,5,7,13,15)$
   c) $F(x,y,z)=x'z'+y'z'+yz'+xy$ (Use only K-map, do not use algebraic manipulation)

4. Simplify the following Boolean Function F, together with the don't care conditions d, and then express the simplified function in product of maxterms. (15 pt each)

   a)
   $F(A,B,C,D)=\sum(0,6,8,13,14)$
   $d(A,B,C,D)=\sum(2,4,10)$

   b)
   $F(A,B,C,D)=\Pi(1,3,5,7,9,15)$
   $d(A,B,C,D)=\sum(4,6,12,13)$

5. Below is the truth table for converting binary sum to BCD sum. Find the Boolean function of carry (C) . (20 pt each)

Binary Sum					BCD Sum					Decimal
K	Z_8	Z_4	Z_2	Z_1	C	S_8	S_4	S_2	S_1	
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	1	1
0	0	0	1	0	0	0	0	1	0	2
0	0	0	1	1	0	0	0	1	1	3
0	0	1	0	0	0	0	1	0	0	4
0	0	1	0	1	0	0	1	0	1	5
0	0	1	1	0	0	0	1	1	0	6
0	0	1	1	1	0	0	1	1	1	7
0	1	0	0	0	0	1	0	0	0	8
0	1	0	0	1	0	1	0	0	1	9
0	1	0	1	0	1	0	0	0	0	10
0	1	0	1	1	1	0	0	0	1	11
0	1	1	0	0	1	0	0	1	0	12
0	1	1	0	1	1	0	0	1	1	13
0	1	1	1	0	1	0	1	0	0	14
0	1	1	1	1	1	0	1	0	1	15
1	0	0	0	0	1	0	1	1	0	16
1	0	0	0	1	1	0	1	1	1	17
1	0	0	1	0	1	1	0	0	0	18
1	0	0	1	1	1	1	0	0	1	19

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학번_____ 이름_____