CMPEN 271 – Fall 2010

Return this exam! No calculators!

Exam 1

Name:

1. **(2 pts.)** Convert 101000_2 to decimal.

   a)20 b)24 c)40 d)42 e) none of the above

2. **(2 pts.)** Convert 42_{10} to binary.

   a) 010010_2 b) 100010_2 c) 100110_2 d) 100100_2 e) none of the above

3. **(2 pts.)** Convert 42_{16} to binary.

   a) 1000010_2 b) 1000100_2 c) 1000110_2 d) 1001000_2 e) none of the above

4. **(2 pts.)** How many bits are required to represent the numbers between 0 and 127?

   a) 7 b) 8 c) 128 d) 2^{128} e) none of the above

5. **(1 pt.)** Which of the following should be avoided.

   a) Having a single output drive multiple inputs.

   b) Connecting wires together.

   c) Connecting a gate's output to another gate's input.

   d) Connecting outputs together.

   e) Connecting inputs together.

6. **(4 pt.)** Which expression is equivalent to AB'(B+A'C)'?

   a) 0

   b) AB' + AB'C

   c) AB' + AB'C'

   d) A'B + A'BC'

   e) None of the above.

For questions 7-10 assume F(A,B,C)= (A'B + A(B'+ BC'))

7. **(2 pts.)** What does F(0,1,0) equal?

   a) 0 b) 1 c) C d) C' e) none of these

8. **(1 pts.)** What does F(1,1,C) equal?

   a) 0 b) 1 c) C d) C' e) none of these

9. **(2 pt.)** How many AND gates does it take to realize F as is (do not simplify)?

   a) 1 b) 2 c) 3 d) 4 e) none of these

10. **(2 pt.)** How many OR gates does it take to realize F as is (do not simplify)?

    a) 1 b) 2 c) 4 d) 5 e) none of these

Utilize the following truth table for problems 11 and 12.

A	B	C	F	G
0	0	0	1	1
0	0	1	0	0
0	1	0	0	0
0	1	1	0	1
1	0	0	1	1
1	0	1	1	0
1	1	0	0	1
1	1	1	0	1

11. **(2 pt.)** What function is described by $\prod M(0,3,4,6,7)$?

    a) F b) F' c) G d) G' e) none of the above

12. **(2 pt.)** How many product terms does the canonical POS expression for F have?

    a) 1 b) 2 c) 3 d) 4 e) 5

13. **(3 pts.)** How many different SOP_{min} solutions exist for F(A,B,C)=Σm (1,3,4,5,6) ?

    a) 1 b) 2 c) 3 d) 4 e) 5

$A\backslash BC$	00	01	11	10
0				
1				

Utilize the following word statement for problems 14 and 15.

Design a 4-input $a_1a_0b_1b_0$, two output o_1o_0 digital circuit. $A = a_1a_0$ and $B = b_1b_0$ represent 2-bit binary numbers. The output is the smaller of A and B. For example, if $A = 10$ and $B = 01$, then $O = 01$.

14. **(2 pt.)**How many rows of the truth table will have $O_1 = 1$?

    a) 1 b) 4 c) 9 d) 12 e) None of the above.

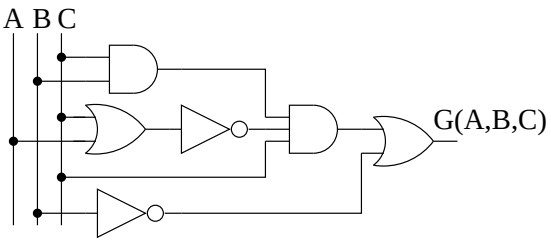
15. **(2 pt.)**How many rows of the truth table will have $O_0 = 0$?

    a) 1 b) 4 c) 9 d) 12 e) None of the above.

16. **(1 pt.)**A grouping of 4 cells generates a product term with 4 variables. How many variables does the kmap have?

    a) 3 b) 4 c) 5 d) 6 e) None of the above.

For questions 17,18 use the figure below.



a_1	a_0	b_1	b_0	o_1	o_0
0	0	0	0		
0	0	0	1		
0	0	1	0		
0	0	1	1		
0	1	0	0		
0	1	0	1		
0	1	1	0		
0	1	1	1		
1	0	0	0		
1	0	0	1	0	1
1	0	1	0		
1	0	1	1		
1	1	0	0		
1	1	0	1		
1	1	1	0		
1	1	1	1		

Truth Table for O

17. **(2 pt.)** What is the symbolic representation of $G(A, B, C)$ (do not simplify).

    a) BC + (A + C)' + B'

    b) BC(A+C)' + B'

    c) BC(A+C)'C + B'

    d) B'

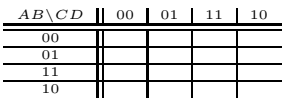
    e) None of the above.

18. **(2 pt.)** What is G(1,1,0)=?

    a) 1

    b) 0

19. **(4 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)=Σm(1,2,3,7,8,9,11,15)



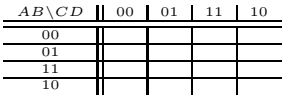
a) A'B'D + A'B'C + ACD + AB'C'D' + AB'CD'

b) A'B'C + AB'C'+ B'D + CD

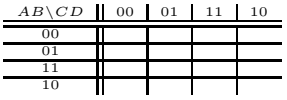
c) A'B'C + A'BD + AB'C'+ AB'D + CD

d) A'B' + AB' + CD

e) None of the above.



20. **(4 pt.)** Determine the POS_{min} expression for F(A,B,C,D)=∏M(0,1,3,4,6,11,13,15)*∏d(2,7,8,9,14)



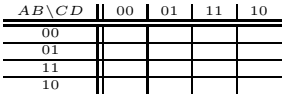
a) (A'+D)(A+B'+D')

b) (A'+C+D)(A+B'+D')(A'+C'+D)

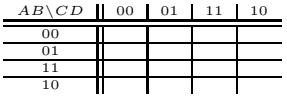
c) (A+B'+D')(A'+D')(B+D')(A+B+C)

d) (A+B'+C+D)(A'+B+C'+D)(A+B'+C+D')

e) None of the above.



21. **(4 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)= A'D+BD+AC'D'+AB'D



a) A + D

b) AC' + D

c) AC'D' + D

d) AC'D + A'D + AB

e) None of the above.