CMPEN 271 – Spring 2012

Return this exam! No calculators!

Exam 1

Name:

1. **(2 pts.)** Convert 100100_2 to decimal.

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

2. **(2 pts.)** Convert 36_{10} to binary.

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

3. **(2 pts.)** Convert 36_{16} to binary.

   a) 110010_2 b) 110100_2 c) 110110_2 d) 111000_2 e) none of the above

4. **(2 pts.)** How many bits are required to represent the numbers between 0 and 78_{10}?

   a) 6 b) 7 c) 78 d) 2^{78} e) none of the above

5. **(1 pts.)** When representated as 4-bit binary numbers does $12 + 4$ generate overflow?

   a) yes b) no c) Trick question, 12 cannot be represented in 4-bit

6. **(1 pt.)** How many 1's does the output column in a truth table for a 5-input NAND gate have?

   a) 0 b) 1 c) 5 d) $2^5 - 1$ e) 2^5

7. **(1 pt.)** Which expression is equivalent to (A'+B)'(B'+AC)?

   a) 0

   b) 1

   c) AB'

   d) A'B + A'BC'

   e) AB' + A'BC'

For questions 8-11 assume F(A,B,C)= (A+B')C' + AB'C

8. **(2 pts.)** What does F(1,1,0) equal?

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

9. **(2 pts.)** What does F(1,0,C) equal?

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

10. **(1 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

11. **(1 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 12,13.

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

12. **(1 pt.)** What function is described by $\prod M(0,4,5)$?

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

13. **(1 pt.)** How many product terms does the canonical SOP expression for F have?

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

Utilize the following word statement for problems 14-15.

Design a 4-input $a_1a_0b_1b_0$, 4-output $O_3O_2O_1O_0$ digital system. $A = a_1a_0$ and $B = b_1b_0$ represent 2-bit binary numbers. The output should be the product (multiplication) of the inputs plus 5, that is $O = A * B + 5$.

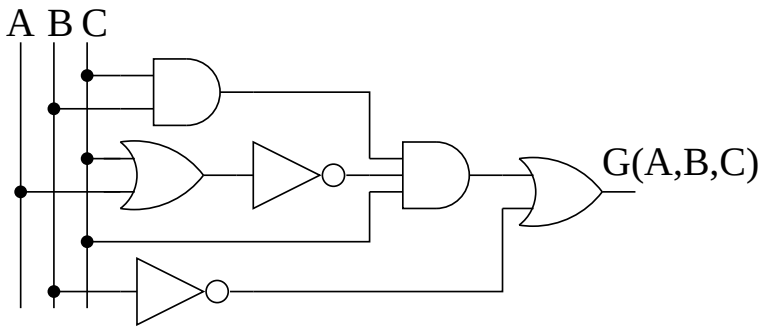
14. **(1 pt.)**How many rows will have the output 1011_2?

    a) 0 b) 1 c) 2 d) 3 e) None of the above.

15. **(1 pt.)**How many rows of the truth table will have $O_0 = 1$?

    a) 1 b) 3 c) 9 d) 12 e) None of the above.

Utilize the following circuit diagram for problems 16,17.



16. **(4 pts.)** What is the symbolic representation of $G(A, B, C)$ as shown?

    a) B'
    b) BC + (B+C)C + B'
    c) (BC)(A'C')C + B'
    d) (BC)(A+C)'C + B'
    e) None of the above.

17. **(2 pts.)** What does G(0,1,0) equal?

    a) 0 b) 1 c) None of the above

18. **(4 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)=Σm(0,6,8,10,13,14,15)

    a) BCD' + ACD' + ABC' + A'B'C'D' + AB'C'D'
    b) BCD' + ACD' + ABC' + B'C'D'
    c) B'C'D' + AB'D' + BC"D' + ABD
    d) CD' + AB + B'C'D'
    e) None of the above.

$AB\backslash CD$	00	01	11	10
00				
01				
11				
10				

19. **(4 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)=Σm(3,6,9,12) + Σd(0,4,7,8,14)

    a) C'D' + AB' A'CD + BCD'
    b) A'C' + A'B'D' + BC'D + AB'C
    c) BD' + A'CD + AB'C'
    d) BC'D' + AB'C' + A'CD + BCD'
    e) None of the above.

$AB\backslash CD$	00	01	11	10
00				
01				
11				
10				

20. **(4 pt.)** Determine the POS_{min} expression for
F(A,B,C,D)= (A+B'+D)(B+C')(B'+C'+D)

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

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

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

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

e) None of the above.

$AB\backslash CD$	00	01	11	10
00				
01				
11				
10				

$AB\backslash CD$	00	01	11	10
00				
01				
11				
10				