CMPEN 271 – Fall 2012

Return this exam! No calculators!

Exam 1

Name:

1. **(2 pts.)** Convert 010100_2 to decimal.

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

2. **(2 pts.)** Convert 24_{10} to binary.

   a) 010010_2 b) 100010_2 c) 001100_2 d) 011000_2 e) none of the above

3. **(2 pts.)** Convert 24_{16} to binary.

   a) 110010_2 b) 110100_2 c) 001100_2 d) 011000_2 e) none of the above

4. **(2 pts.)** What is the largest decimal number that you can make with 8 bits?

   a) 256 b) 255 c) 32 d) 2^8 e) none of the above

5. **(1 pts.)** When represented as 4-bit binary numbers does 8 + 8 generate overflow?

   a) yes b) no c) 8 cannot be represented in 2's complement

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

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

7. **(2 pt.)** Which expression is equivalent to (A'+B)'(B+AC)?

   a) 0

   b) 1

   c) AB'C

   d) AB' + AB'C

   e) None of the above

For questions 8-10 let F(A,B,C)= AB'C + (A+B')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(0,0,C) equal?

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

10. **(1 pt.)** How many OR gates does it take to realize F as is (do not simplify)?

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

Utilize the following truth table for problems 11,12.

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

11. **(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

12. **(1 pt.)** How many product terms does the canonical SOP expression for G' have?

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

Utilize the following word statement for problems 13,14.

Design a 4-input digital system where the input $A = a_3a_2a_1a_0$ represent a 4-bit binary number. The output is the input divided by 3. Fractional answers should be rounded up to the nearest integer.

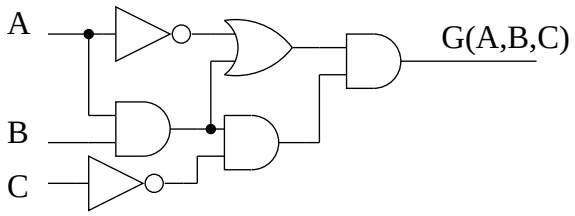
13. **(1 pt.)**How many rows will have the output 11_2?

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

14. **(1 pt.)**How many bits of output are needed?

    a) 1 b) 2 c) 3 d) 5 e) None of the above.

Utilize the following circuit diagram for problems 16,17.



15. **(3 pts.)** What is the symbolic representation of $G(A, B, C)$ as shown?

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

16. **(1 pts.)** What does G(0,1,1) equal?

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

17. **(1 pt.)** How many distinct SOP_{min} solutions exist for F(A,B,C)=Σm(1,2,3,4,5)

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

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

18. **(3 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)=Σm(1,5,6,7,11,12,14,15)

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

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

19. **(3 pt.)** Determine the SOP_{min} expression for F(A,B,C,D)=Σm(1,4,5,9,11,14) + Σd(6,7,10,12)

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

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

20. **(3 pt.)** Determine the POS_{min} expression for F(A,B,C,D)= B'D' + A'D' + BC'D + ACD

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

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

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

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

21. **(2 pt.)** You are working on a kmap and find a legal grouping of 8 1's which requires 3 variables to represent. How many variables does the function have?

a) 3 b) 4 c) 5 d) 6 e) Not enough information.

22. **(1 pt.)** A cell in a 7 variable kmap is adjacent to how many other cells?

a) 4 b) 6 c) 8 d) 10 e) None of the above.