CMPEN 271 – Fall 2008

Return this exam! No calculators!

Exam 1

Name:

1. **(1 pt.)**Design is ...

   a) A box whose input and outputs are binary numbers.

   b) The transformation of a working system into a word statement.

   c) A boolean variable can equal either 0 or 1.

   d) One of the representations of a logical function.

   e) None of the above.

2. **(2 pts.)** Convert 101011_2 to decimal.

   a) 16 b) 24 c) 42 d) 84 e) none of the above

3. **(2 pts.)** Convert 35_{10} to binary.

   a) 110101_2 b) 010111_2 c) 111111_2 d) 100011_2 e) none of the above

4. **(2 pts.)** Convert 35_{16} to decimal.

   a) 24 b) 35 c) 48 d) 53 e) none of the above

5. **(2 pts.)** What is the largest number that you can make with N-bits?

   a) $log_2(N)$ b) N c) N^2 d) $2^N - 1$ e) none of the above

6. **(1 pt.)**Which of the following describes a normal design process?

   a) WS → TT → CD → Sym

   b) WS → Sym → TT → CD

   c) WS → CD → Sym → TT

   d) WS → TT → Sym → CD

   e) WS → Kmap → CD

For questions 7-11 assume F(A,B,C)= ((A'B)'C + (BC')')'

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

   a) 0
   b) 1
   c) C
   d) C'
   e) Not enough information.

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

   a) 0
   b) 1
   c) C
   d) C'
   e) Not enough information.

9. **(1 pt.)** How many NOT gates does it take to realize F as is (do not simplify)?

   a) 1
   b) 2
   c) 3
   d) 4
   e) None of the above.

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 the above.

11. **(2 pts.)** 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 the above.

Utilize the following truth table for problems 12-15.

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

12. **(1 pt.)**What function is described by $\sum m(0,3,4,6,7)$?

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

13. **(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

14. **(1 pt.)** How many product terms does the canonical SOP expression for F' have?

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

15. **(1 pt.)** How many sum terms does the canonical POS expression for G have?

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

16. **(2 pts.)** A'+AB' = A+B'

    a) True

    b) False

17. **(3 pts.)** What is the SOP_{min} expression for $F = AB'(A'C + B') + A'(C + C'B')$?

    a) B'

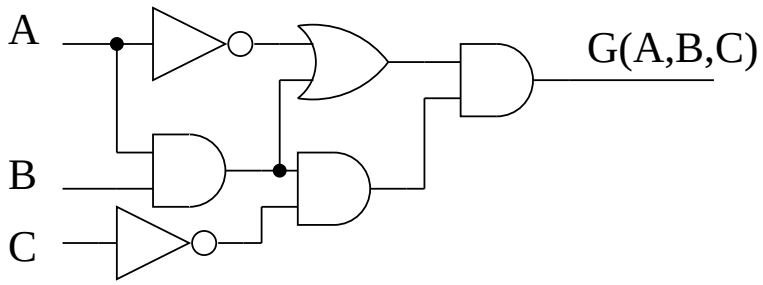
    b) B' + A'

    c) B' + A'C

    d) AB' + A'C + A'B'

    e) None of the above.

Utilize the following circuit diagram for problems 18,19.



18. **(4 pts.)** What is the symbolic representation of $G(A, B, C)$ as shown?

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

19. **(2 pts.)** What does G(0,1,0) equal?

    a) 0 b) 1

20. **(1 pt.)** A cell in a 8 variable kmap is adjacent to how many other cells?

    a) 3
    b) 8
    c) 16
    d) 64
    e) 256

21. **(2 pts.)** How many different SOP_{min} solutions exist for F(A,B,C)=Σm(0,2,5,6,7) ?

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

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

22. **(4 pts.)** Determine the SOP_{min} expression for F(A,B,C,D)=$\sum m(0,1,5,6,7,8,9,14)$

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

a) A'B'C' + A'BD + BCD' + AB'C'

b) B'C' + A'BD + BCD'

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

d) B'C'D' + B'C'D + A'BD + BCD'

e) None of the above.

23. **(4 pts.)**Determine the SOP_{min} realization for F.

A	B	C	F
0	0	X	1
1	0	0	0
1	1	X	X
0	X	0	1
1	0	1	0
X	1	1	X

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

a) A'+ B

b) A+BC'

c) A + C'

d) A'BC' + A'B'

e) None of the above.

24. **(6 pts.)** Determine the POS_{min} expression for $F(A,B,C,D) = (A'+D)(A'+B'+C')(A+B+D')(B'+C'+D')(A+B'+C+D')$, show your work.