

CSE 271 – Spring 2001

Return this exam! No calculators!

Exam 1

Name:

SSN:

For questions 1-5 assume a word size of 6 bits.

1. **(2 pt.)** Convert 101011_2 to decimal.

- a) 16
- b) 24
- c) 42
- d) 84
- e) None of the above.

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

- a) 110101_2
- b) 010111_2
- c) 111111_2
- d) 100011_2
- e) None of the above.

3. **(2 pt.)** Convert 35_{16} to binary.

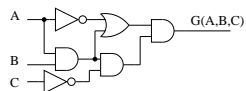
- a) 011101_2
- b) 110101_2
- c) 100011_2
- d) 101011_2
- e) None of the above.

4. **(1 pt.)** If overflow occurs indicate it, otherwise identify the correct answer: $111010_2 + 011011_2$
- a) 100101_2
 - b) 110101_2
 - c) 111111_2
 - d) 101011_2
 - e) Overflow occurs.
5. **(1 pt.)** If overflow occurs indicate it, otherwise identify the correct answer: $101011_2 + 010011_2$
- a) 011101_2
 - b) 110101_2
 - c) 111110_2
 - d) 101011_2
 - e) Overflow occurs.

For questions 6-8 assume $F(A,B,C,D) = A(B'+C) + A'C'(B+D)$

6. **(2 pt.)** What does $F(0,1,0,0)$ equal?
- a) 0
 - b) 1
 - c) A
 - d) A'
 - e) Not enough information.
7. **(2 pt.)** What does $F(A,1,0,0)$ equal?
- a) 0
 - b) 1
 - c) A
 - d) A'
 - e) Not enough information.

8. **(2 pt.)** How many AND gates does it take to realize F as is (do not simplify)?
- a) 3
 - b) 5
 - c) 7
 - d) 8
 - e) None of the above.
9. **(3 pt.)** What is the symbolic representation of $F(A, B, C, D)$ shown as shown in the figure below?



- a) $((A' + C'))' + D + AB)'B$

- b) $((A+C)' + D + AB)'B$
 - c) $(A+C+B+AB)'B$
 - d) $(A+C'+D+AB)'B$
 - e) $(A'+C'+D+AB)'B'$
10. (2 pt.) If $F(A,B,C,D)=A'CD+B'CD$, what does F' equal?
- a) $AC'D'+BC'D'$
 - b) $(A'+C+D)(B'+C+D)$
 - c) $(AC'D')(BC'D')$
 - d) $(A+C'+D')(B+C'+D')$
 - d) $(A+C'+D')(B+C'+D')$
 - e) None of the above.

11. **(1 pt.)** A logic function whose output equals 1 when any input equals 1, describes which elementary logic function?
- a) AND
 - b) OR
 - c) NAND
 - d) NOR
 - e) XOR
12. **(1 pt.)** Which of the following describes a normal design process?
- a) $WS \rightarrow TT \rightarrow CD \rightarrow Sym$
 - b) $WS \rightarrow Sym \rightarrow TT \rightarrow CD$
 - c) $WS \rightarrow CD \rightarrow Sym \rightarrow TT$
 - d) $WS \rightarrow TT \rightarrow Sym \rightarrow CD$
 - e) $WS \rightarrow Kmap \rightarrow CD$
13. **(3 pt.)** A circuit has two 4 bit inputs, each representing a binary number. The output represents the product of the two inputs. How many bits of output are required in this circuit?
- a) 4
 - b) 6
 - c) 8
 - d) 16
 - e) 225
14. **(2 pt.)** You are working on a kmap and find a legal grouping of 8 1's. When you write the product term for this grouping it contains 4 variables. How many variables does the function have?
- a) 4
 - b) 5
 - c) 7
 - d) 8
 - e) None of the above.

15. **(3 pt.)** Does $AB'C + BC + A'BC'$ equal $A'C + BC + A'B$? Hint, the answer is not c.
- Yes
 - No
 - Maybe?
 - None of the above.
16. **(1 pt.)** Given a function $F(A,B,C)$, what is the maxterm for the input $B=1$ $A=0$ and $C=1$?
- $A'BC$
 - $AB'C'$
 - $A + B' + C'$
 - $A' + B + C$
 - None of the above.
17. **(2 pt.)** How many rows does a truth table of 9 variables have?
- 81
 - 256
 - 512
 - 729
 - 1024
18. **(2 pt.)** A cell in a 7 variable kmap is adjacent to how many other cells? Equivalent wording: How many Manhattan neighbors does a cell in a 7 variable kmap have?
- 6
 - 7
 - 14
 - 49
 - 128
19. **(4 pt.)** Determine the SOP_{\min} expression for $F(A,B,C,D)=\Sigma m(4,7,9,10,12,13,14,15)$
- $BC'D' + AC'D + BCD + ACD'$
 - $AB + BC'D' + AC'D + BCD + ACD'$
 - $B'C'D' + A'C'D + B'CD + A'CD'$
 - $AB + A'BC'D' + AB'C'D + A'BCD + AB'CD'$
 - None of the above.

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

20. (4 pt.) Determine the SOP_{\min} expression for
 $F(A,B,C,D) = \Sigma m(0,1,3,5,8,10,11,14) + \Sigma d(4,12,13)$

- a) $C'D' + A'C' + A'B'D + AB'C + ACD'$
b) $A'C' + BC' + AD'B'CD$
c) $A'C' + AD' + B'CD$
d) $C' + B'CD + ACD'$
e) None of the above.

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

21. (4 pt.) Determine the SOP_{\min} expression for
 $F(A,B,C,D) = (A+D')(A'+B'+C)(A'+C'+D')(A'+B+C+D)(A'+B+C'+D)$

- a) $AD + AC'D + A'B'CD'$
b) $A'D' + BCD' + AB'C'D$
c) $A'D + BD + AC'D' + AB'C$
d) $A'D + ABC' + ACD + AB'C'D' + AB'CD'$
e) None of the above.

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

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

22. (3 pt.) Determine the SOP_{\min} realization for F.

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

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

- a) $AB'C' + AC$
b) $A'B' + BC'$
c) $A + B' + C'$
d) $C' + AC$
e) None of the above.