

EE -18
Introduction to Digital Computers
Exam 1 Solution
Fall, 1999
Prof. Traver

Name_____Key_____

Show all your work for all problems and clearly indicate your final answer. All problems are worth 10 points.

1.

a. Convert the following decimal number to binary.

31.75

11111.11

b. Convert the following binary number to hexadecimal.

1100101000010101.111

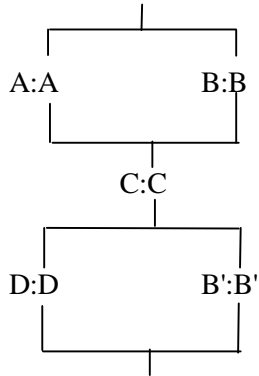
CA15.E

2. Find the complement of the following expression and write it in sum of product form.

$$F = (A' + B)(B + C')D$$

$$F' = AB' + B'C + D'$$

3. Find the function represented by a closed path from the top to bottom of the N-type transistor network below.



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

4. Create a K-map for the following function. You do NOT have to minimize the function.

$$F = A(B + C') + AB'$$

		C			
		00	01	11	10
AB	0	0	0	0	0
	1	1	1	1	1

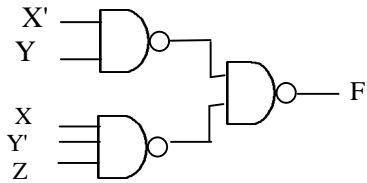
5. Find a minimum sum of product expression for the function G.

$$G(A,B,C,D) = \sum m(2,3,4,5,12,13) + \sum d(10,11,14,15)$$

$$G = BC' + B'C$$

6. Draw a NAND-NAND circuit for the following function.

$$F = X'Y + XY'Z$$



7.

a. Find the 8-bit signed-magnitude representation of -30 .

$$+30 = 00011110$$

$$-30 = 10011110$$

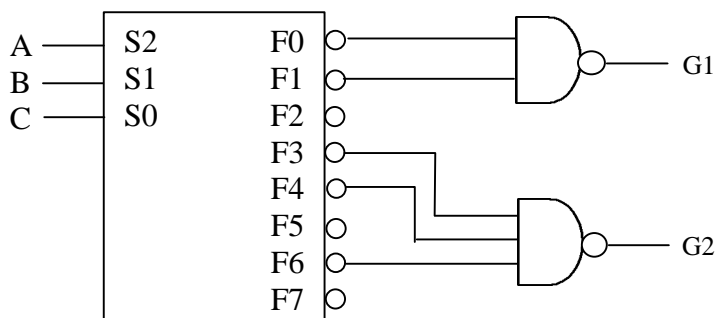
b. Find the 8-bit one's complement representation of -30 .

$$-30 = 11100001$$

c. Find the 8-bit two's complement representation of -30 .

$$-30 = 11100010$$

8. Write expressions for the functions that are implemented by the decoder and NAND gates below.

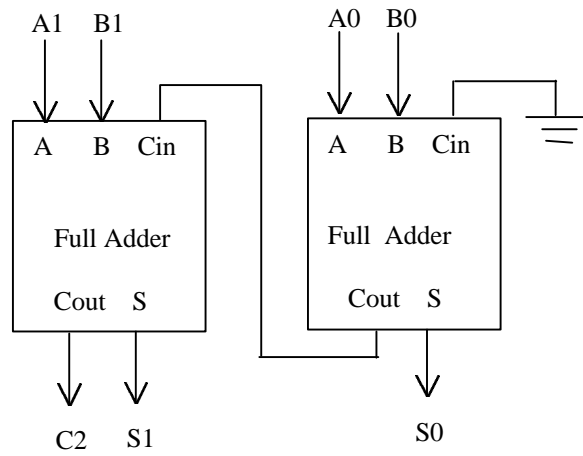


$$G1 = A'B'C' + A'B'C = m_0 + m_1$$

$$G2 = A'BC + AB'C' + ABC' = m_3 + m_4 + m_6$$

9. The circuit below is a 2-bit adder, constructed from two full-adders. Fill in the truth table for this circuit.

A1	A0	B1	B0	C2	S1	S0
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	1	0
0	0	1	1	0	1	1
0	1	0	0	0	0	1
0	1	0	1	0	1	0
0	1	1	0	0	1	1
0	1	1	1	1	0	0
1	0	0	0	0	1	0
1	0	0	1	0	1	1
1	0	1	0	1	0	0
1	0	1	1	1	0	1
1	1	0	0	0	1	1
1	1	0	1	1	0	0
1	1	1	0	1	0	1
1	1	1	1	1	1	0



10. Implement the function F with the multiplexor shown below. Notice that the function is given in product of maxterm form. Hint: Draw the truth table for the function.

$$F(X,Y,Z) = \prod M(0,2,4,5,7)$$

