94

paper

Cp Eng 111, Section B
Fall 1999

Exam 3
11/19/99

Name: Jesse Thi
11/19/99

Show all work on the exam papers. If you need additional space, use the reverse side of the paper. Closed book, closed notes, no calculator.

1. (a) Find the 8-bit 1's complement of 10100111
(12)

01011000

(b) Find the 8-bit 2's complement of 10010010

1s: 01101101

2s: 01101110

01101101
01101110

(c) If 1000111 is a signed number with the most significant bit representing the sign and the remainder of the number representing its magnitude, what decimal number does this binary number represent?

64 32 16 8 4 2 1

1 = neg

-7

(d) If 1000111 is a signed number with the most significant bit representing the sign and the remainder of the number in 2's complement, what decimal number does this binary number represent?

64 32 16 8 4 2 1

-64 + 7

-57

64
-57
-60

✓

Name: Jesse Lew

2. (12) Determine whether each of the following is True (T) or False (F). Circle the appropriate choice.

(a) A gate whose output depends only on the current input combination is called a combinational circuit.

T (F) X

(b) To represent the 8-bit word, 10111010, in an extended word with even parity, the parity bit would be 1.

(T) F

(c) Using a parity bit with odd parity, you can detect if an odd number of errors has occurred.

(T) F

(d) Using a parity bit with even parity, you can detect if an even number of errors have occurred.

even parity
01011 0 errors 1 error 3 errors
11011 0 errors 2 errors 4 errors Don't Know
Don't Know

odd
01011 0 errors 2 errors 4 errors Don't Know
11011 1 error 3 errors Know

T (F)

3. (12) For each of the following, consider an 8-bit register whose initial value is 10101001. Assume this initial state for each operation below; determine the contents of the register after each operation.

(a) SHL 1 01010010

X 01010010

(b) SHR 2 00101010

00 101010 X

(c) ROL 2 10100110

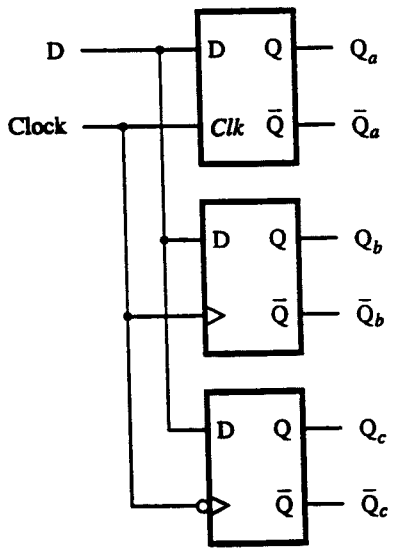
10 10100 1 10

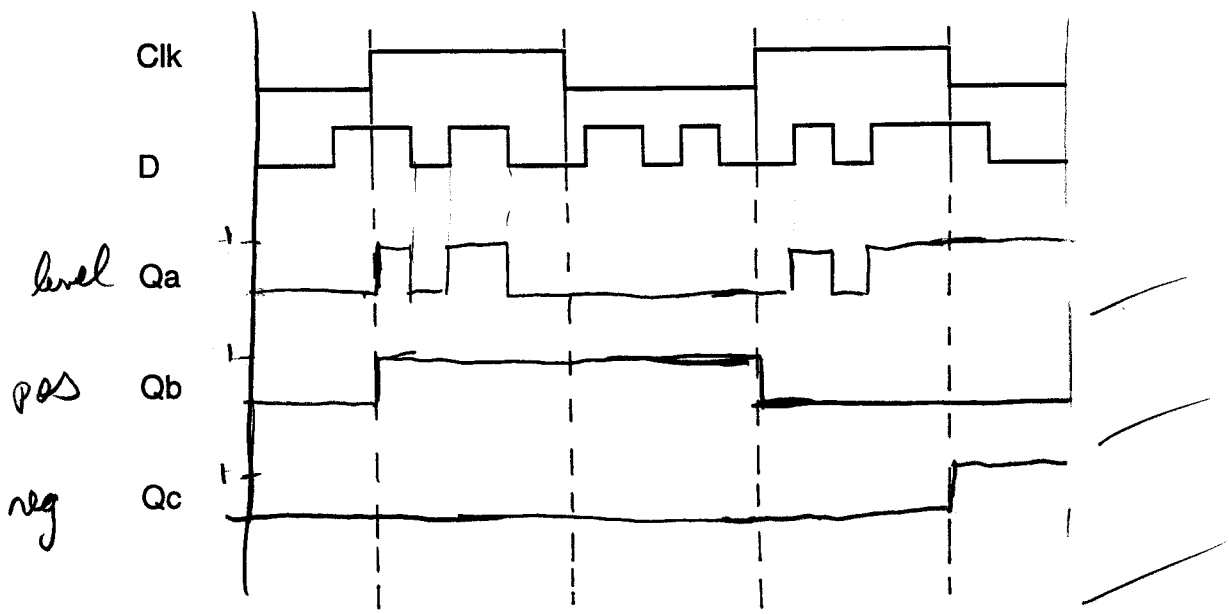
(d) ROR 3 00110101

001 10101 001

Name: Jesse Ku

4. In the circuit below, assume an initial value of 0 for Q.
(12) Complete the timing diagram for Qa, for Qb, and for Qc.

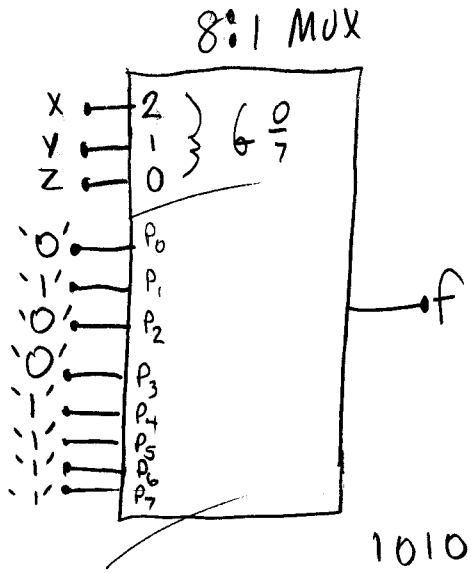




Name: Jesse Kim

5. (10) Use a multiplexor unit to implement the function G defined by the following Karnaugh map.

x \ yz	00	01	11	10
0	0	1	0	0
1	1	1	1	1



10101010
10101011
10110110
+ 10101011
101100001

6. (12) Perform the following binary operations without converting to decimal; you can convert to decimal to check your answer.

(a) 10110110 + 01010101

10110110
01010101
100001011

(b) 10110110 − 01010101

01100001

1s: 10101010
2s: 10101011

10110110
+ 10101011
101100001

(c) 1011 x 0111

1001101

1011
× 0111
1011
1011
1011
0000
1001101

1011
0111
1011
1011
1011
1001101

64 32 16 8 4 2 1
64
+ 13
77

Name: Jessa Lee

7. (12) (a) In most cases, the product of two n-bit 2's complement numbers requires fewer than 2n bits to represent it. In fact, there is only ~~case which~~ requires the full 2n bits. What is it?

each digit must be a 1
ex.' 11 and 11

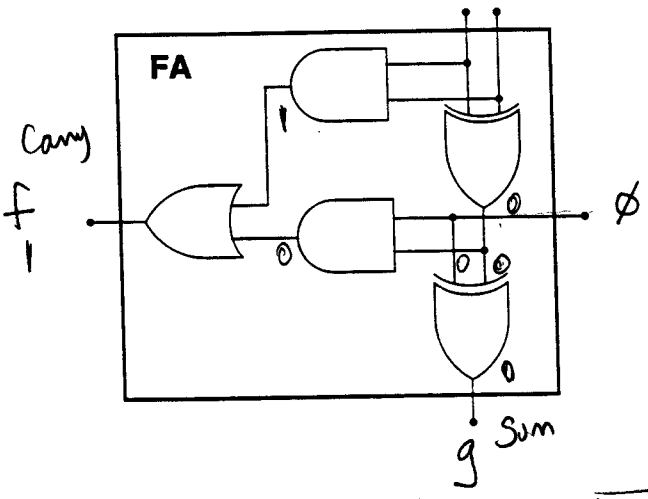
(e) In a ternary (base 3) system, there are three digits: 0, 1, 2. Complete the following table to define a ternary half-adder:

a	b	sum	carry
0	0	0	0
0	1	1	0
0	2	2	0
1	0	1	0
1	1	2	0
1	2	0	1
2	0	2	0
2	1	0	1
2	2	1	1

Name: Jesse Assi

8. (18) Given each of the following with input values as shown, determine the output.

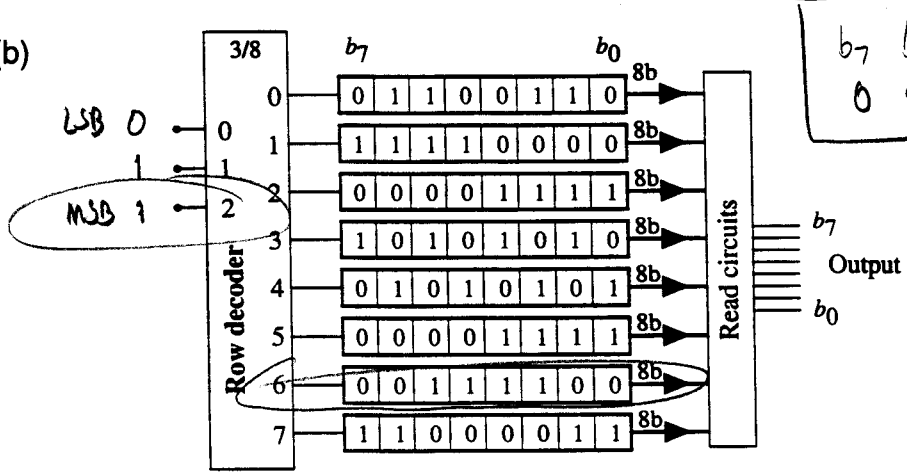
(a)



f = '1'
g = '0'

1 1 0
1
C₁ 1
1 0

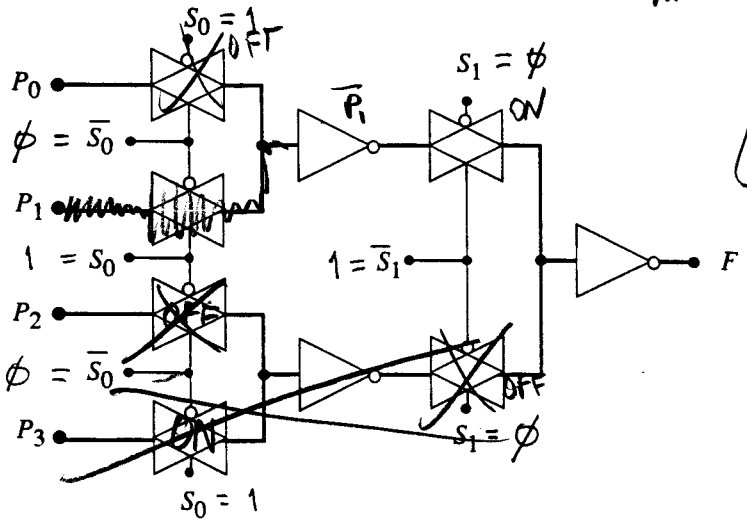
(b)



b_7	b_6	b_5	b_4	b_3	b_2	b_1	b_0
0	0	1	1	1	1	0	0

42
110

(c)



MUX 4:1

$S_0 = 1$
$S_1 = 0$

F = P₁