hroac2HW5

by Hannah Roach

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HW5 (50 points total) (Sections 10.1 and 10.2
Computer Organization and Architecture
CSC 376

Some of the problems are from the textbook, however note that some problems below have more requirements than the book. The assignment needs to be submitted in PDF format and it needs to be named as follows: UIS user ID and then add HW5. (Mine is mdavi03sHW5.pdf)

For grading purposes, truth tables must be shown with inputs in "numerical" order. See Figures 10.6, 10.10, and 10.18 for examples. I will not grade your work if out of order. For grading purposes, K-Maps must follow the format of Figure 10.26 for a three variable table and 10.33 for a four-variable table. I will not grade your work if the variables are switched or the sequence is not in the order shown in the Figures.
The assignment may be handwritten & scanned but it must be legible and orderly.

Problem 1: Textbook page 542, #15i,#15k #15m, #15n (8 points)
(1 point each) Draw the non-abbreviated logic diagram (1 point each) Construct the truth table for each.

a) $((ab)'(b'c)' + a'b'c')'$ #15i
b) $((abc)' + (a'b'c')'$ #15k
c) $(a \oplus b) \oplus c + ab'c$ #15m
d) $(((a + b)' + c)' + d)'$ #15n

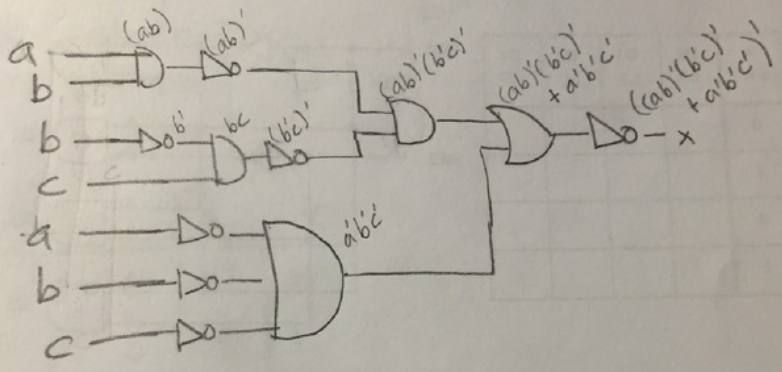
HW 5 50 pts Hannah Roach

CSC 376

Problem #1

15.) Draw the non abreviated logic diagram
Construct Truth Table for each -

[a] #15: $((ab)'(b'c)' + a'b'c')'$



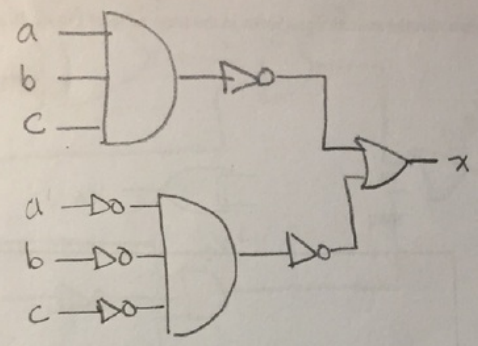
a	b	c	x
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Problem #1

B

#15k

$((abc)' + (a'b'c')')$



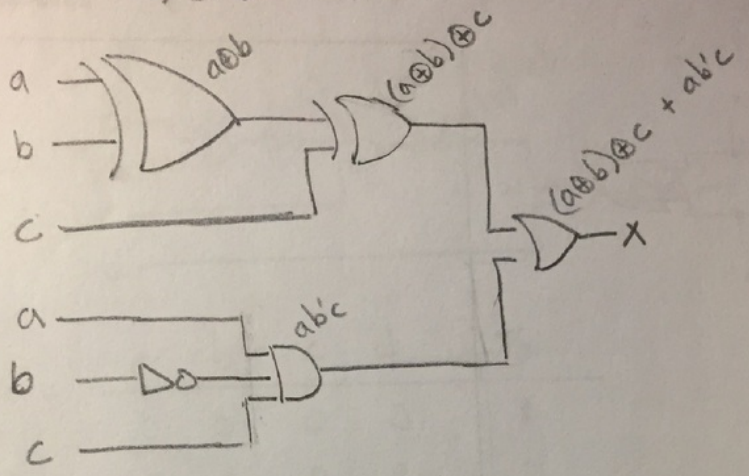
a	b	c	X
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Problem #1

C

$(a \oplus b) \oplus c + ab'c$

#15m



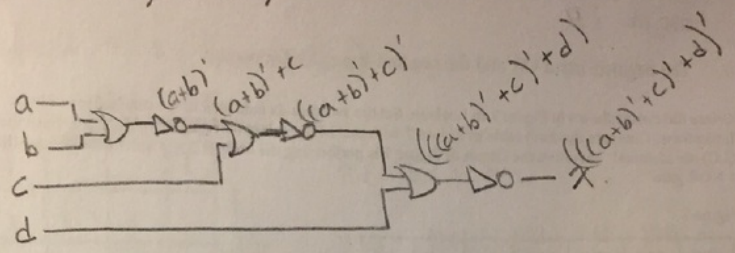
a	b	c	x
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

Problem #1

D

$((a+b)'+c)'+d)'$

#15n



a	b	c	d	x
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

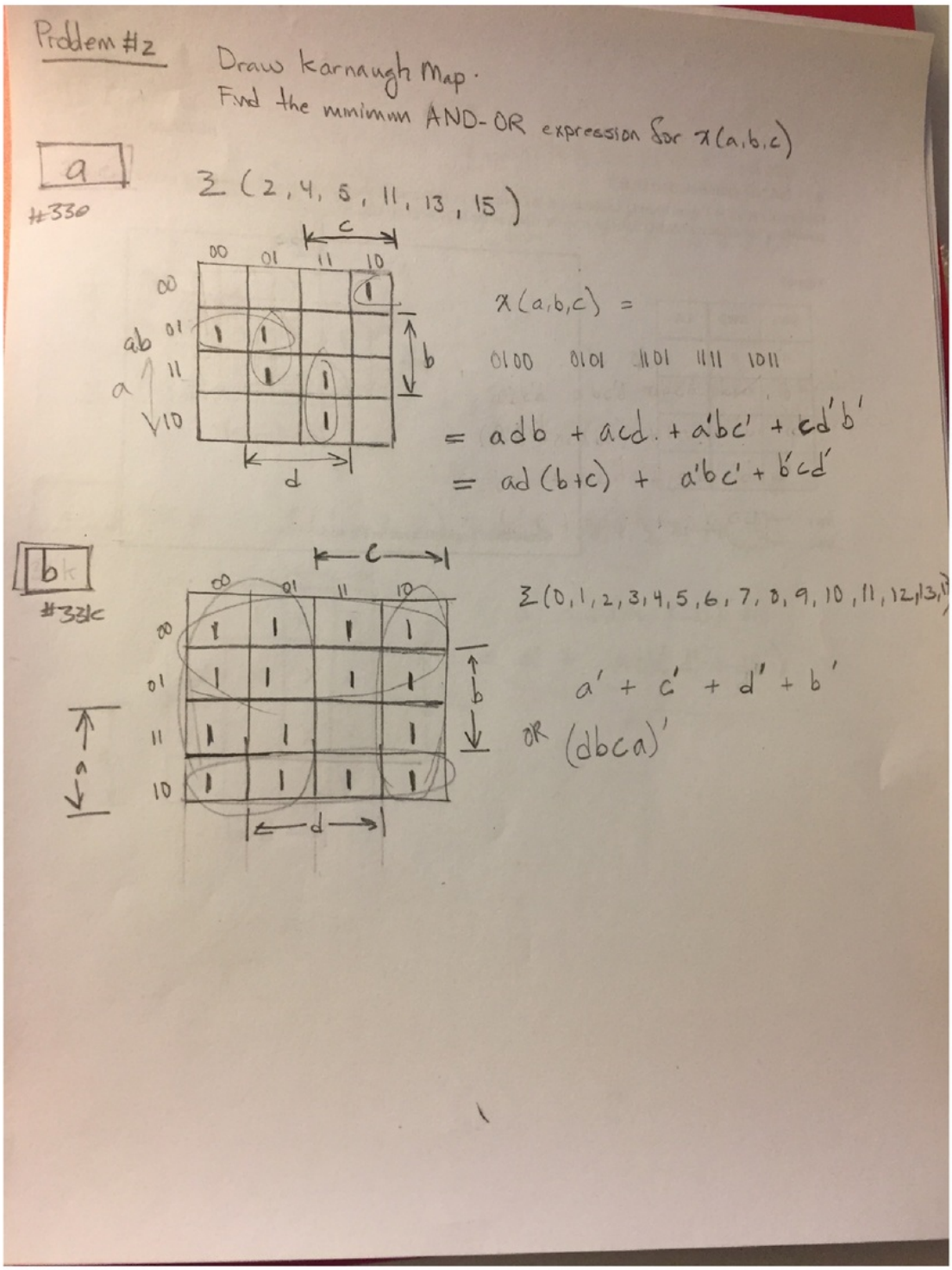
Problem 2: Textbook page 545, #33e, #33k (12 points)

(3 points each) Draw a Karnaugh map

(3 points each) Find the minimum AND-OR expression for x(a,b,c,d).

a) $\Sigma(2,4,5,11,13,15)$ #33e

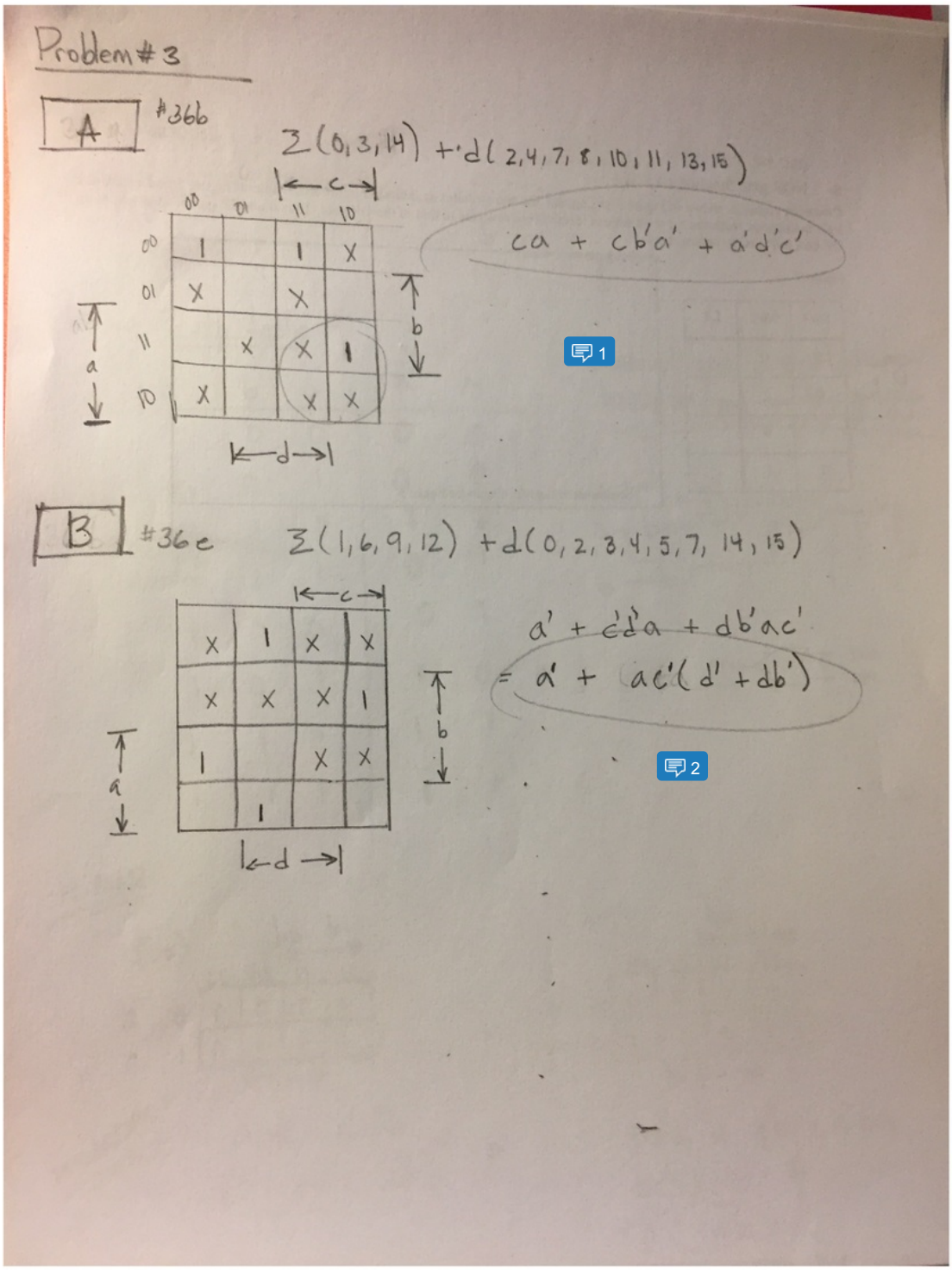
b) $\Sigma(0,1,2,3,4,5,6,7,8,9,10,11,12,13,14)$ #33k



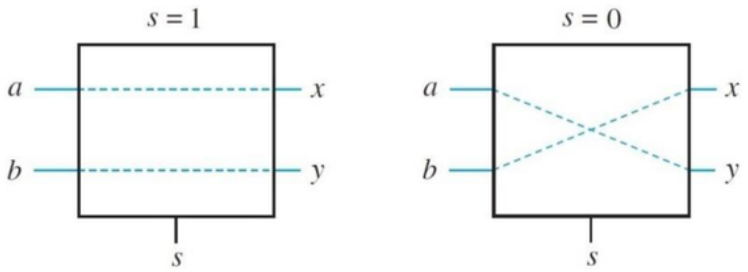
Problem 3: Textbook page 545, #36b, #36e (12 points)

(3 points each) Draw a Karnaugh map
(3 points each) Find the minimum AND-OR expression for x(a,b,c,d) with don't care conditions.

a) Σ(0,3,14) + d(2,4,7,8,10,11,13,15) #36b
b) Σ(1,6,9,12) + d(0,2,3,4,5,7,14,15) #36e
Remember Don't Cares do not have to be circled, but should be used to obtain the largest groupings



Problem 4: (12 points) For this diagram (Similar to Page 547 #51)



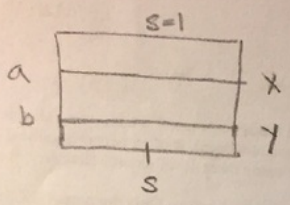
Draw the truth table.

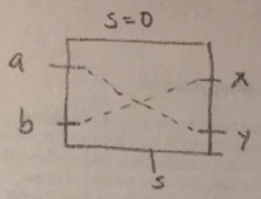
Hint – a, b, & s are the three inputs on your truth table and x & y are the two outputs.

Draw 2 K-Maps - one for output of x and one of for output of y

Find & show the minimum AND-OR expressions - one for f(x) and one for f(y) Construct one circuit using only AND, OR, and inverter gates.

Problem #4

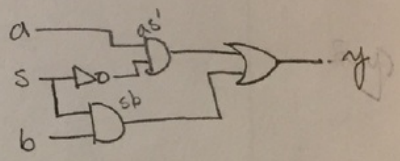




Draw Truth table.

a	b	s	x	y
0	0	0	0	0
0	0	1	0	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	1
1	0	1	1	0
1	1	0	1	1
1	1	1	1	1

Construct one circuit using AND/OR/and inverter gates -



K-MAP

f(x)

a \ bs	00	01	11	10
a' 0	0	0	0	1
a 1	0	1	1	1

asb + a's'b

(as + a's')(b)

f(y)

a \ bs	00	01	11	10
a' 0	0	0	1	0
a 1	1	0	1	1

as'b' + sb + s'ba

as'(b'+b) + sb.

as' + sb

MM AND OR

Problem 5: (6 points) Textbook page 547, #54(b)
Study Fig 10.57 & 10.58 and apply what you have learned about gates to determine the solution.

Notes:

- The A with the bracket in Fig 10.58 indicates A0 thru A7 from the A bus. Your solution will look similar to Fig 10.58 and will have both the A bus and the B bus as inputs.
- The line on top means NOT so this reads NOT A AND B
- There is a presentation that explains 10.57 & 10.58 named Combinational Circuit Blocks posted in Worked Examples.

hroac2HW5

GRADEMARK REPORT

FINAL GRADE

42/50

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

Comment 1

3a b'd' + cd + ac

Comment 2

3b bd' + b'c'd

PAGE 10

PAGE 11

PAGE 12

1-LOGICDIAGRA 4 / 4

FULL CREDIT
(4)

MINUS 1
(3)

MINUS 2
(2)

MINUS 3
(1)

NO CREDIT
(0)

1-TRUTHTABLE 4 / 4

FULL CREDIT
(4)

MINUS 1
(3)

MINUS 2
(2)

MINUS 3
(1)

NO CREDIT
(0)

2-A-KMAP 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

2-A-AND-OR 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

2-B-KMAP 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

2-B-AND-OR 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

3-A-KMAP 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

3-A-AND-OR 2 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

3-B-KMAP 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

3-B-AND-OR 2 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

4-TRUTHTABLE 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

4-KMAPS 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

4-AND-ORS 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

4-CIRCUIT 3 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

5-BUS 0 / 3

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)

FULL CREDIT
(3)

MINUS 1
(2)

MINUS 2
(1)

MINUS 3
(0)

NO CREDIT
(0)