

Name: Brandon A Perez**Notes:**

- **Show your work.**
- Follow all instructions, to include the Homework Policies and Procedures.
- Make sure your answers are clearly marked.

Part 1. Complete the following problems from the book.

4.1 b, c – note that for part c, you need to solve part a. Don't trust the solution in the book.

4.3a

4.4b

4.5

4.21

4.28a

4.35b

Brandon Perez

Homework 4 - Logic

4.1

b. $T_3 \overline{T_1} \quad T_2 \overline{T_4}$

$$(A + B'C) \cdot (\overline{A'B} \oplus D) = F_1$$
$$A'B + D' = F_2$$

A	B	C	D	T ₁	T ₂	T ₃	T ₄	F ₁	F ₂
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	1	0
0	0	1	0	1	0	0	0	0	0
0	0	1	1	1	0	0	1	1	1
0	1	0	0	0	1	0	0	0	0
0	1	0	1	0	1	0	1	1	0
0	1	1	0	1	1	0	0	1	1
0	1	1	1	1	1	0	1	1	1
1	0	0	0	0	0	1	0	0	0
1	0	0	1	0	0	1	1	0	0
1	0	1	0	1	0	1	0	0	0
1	0	1	1	1	0	1	1	1	0
1	1	0	0	0	1	0	0	0	0
1	1	0	1	0	1	0	1	1	0
1	1	1	0	1	1	0	0	1	1
1	1	1	1	1	1	0	1	1	1

c Plot output Boolean functions
on K-maps

	00	01	11	10	
00	0	0	1	1	1 group 4
01	0	0	0	0	
11	0	0	0	0	
10	0	0	1	1	

$$B'C = \overline{B}C \checkmark$$

	00	01	11	10	
00	0	0	0	0	1 group 4
01	1	1	1	1	
11	0	0	0	0	
10	0	0	0	0	

$$A'B = \overline{A}B$$

	00	01	11	10	
00	0	0	1	1	1 group 4
01	0	0	0	0	1 group 8
11	1	1	1	1	
10	1	1	0	1	

$$A + B'C$$

T4

	C'D	AB	CD	AB	CD	D
B	0	0	U	U	0	C
0	0	0	0	0	0	C
D	0	0	0	0	0	C
0	0	0	0	0	0	C
0	0	0	0	0	0	C
0	0	0	0	0	0	C

2 groups of 4
1 group of 2

$$\checkmark B'D \cdot AD + A'BD' = D \odot A'B$$

F₁

0	U	U	U	D		
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

3 groups of 4
1 group of 8

$$A + B'D + BD' + B'C \checkmark = A + B'C \Rightarrow D \odot AB$$

F₂

T	C	C	T			
T	U	U	U	U	U	U
U	0	0	0	0	0	0
U	0	0	0	0	0	0
U	0	0	0	0	0	0
U	0	0	0	0	0	0
U	0	0	0	0	0	0

$$A'B + D' = A'B + D'$$

4.3

a. Write the Boolean functions
for the four outputs in terms of
inputs:

$$Y = AE'S' + BE'S$$

4.4 Design combinational circuit

b value is 1 when input is even

#	X	Y	Z	R	F = Z'
0	000	0	0	1	
1	001	1	0	0	
2	010	0	1	0	
3	011	1	1	0	
4	100	0	0	1	
5	101	1	0	0	
6	110	0	1	0	
7	111	1	1	0	

2

\sum output

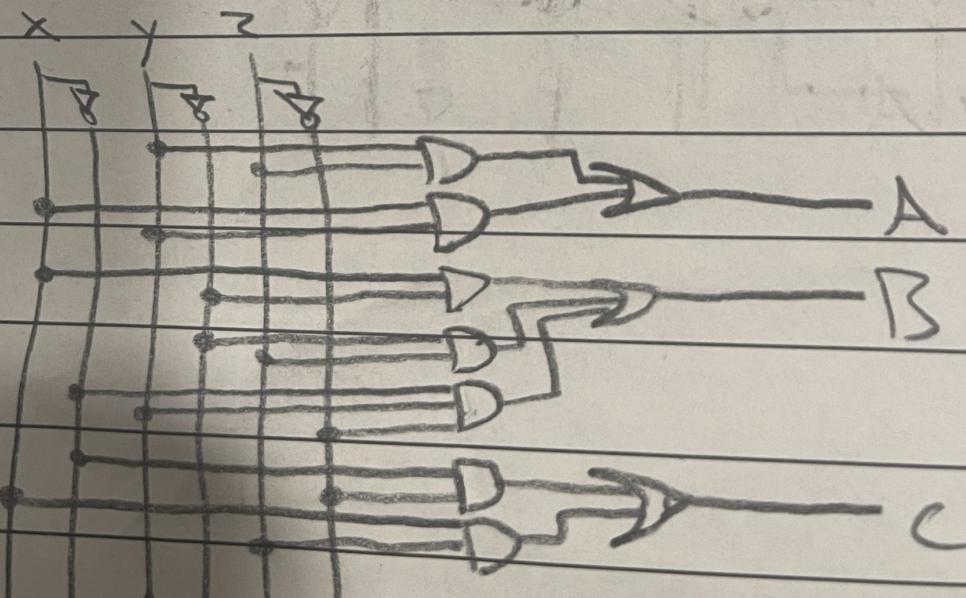
4.5 Design computational circuit with
3 inputs } 3 outputs

when input is 0, 1, 2, 3
output is 1, 2, 3, 4

when input is 4, 5, 6, 7
output is 2, 3, 4, 5

x	y	z	A	B	C	A' B' C'	A'' B'' C''
0	0	0	0	0	0	00000000	00000000
0	0	1	0	0	1	00000001	00000001
0	1	0	0	1	0	00000100	00000100
0	1	1	0	1	1	00000110	00000110
1	0	0	0	1	0	00010000	00010000
1	0	1	0	1	0	00010001	00010001
1	1	0	1	0	0	00011000	00011000
1	1	1	1	0	0	00011010	00011010

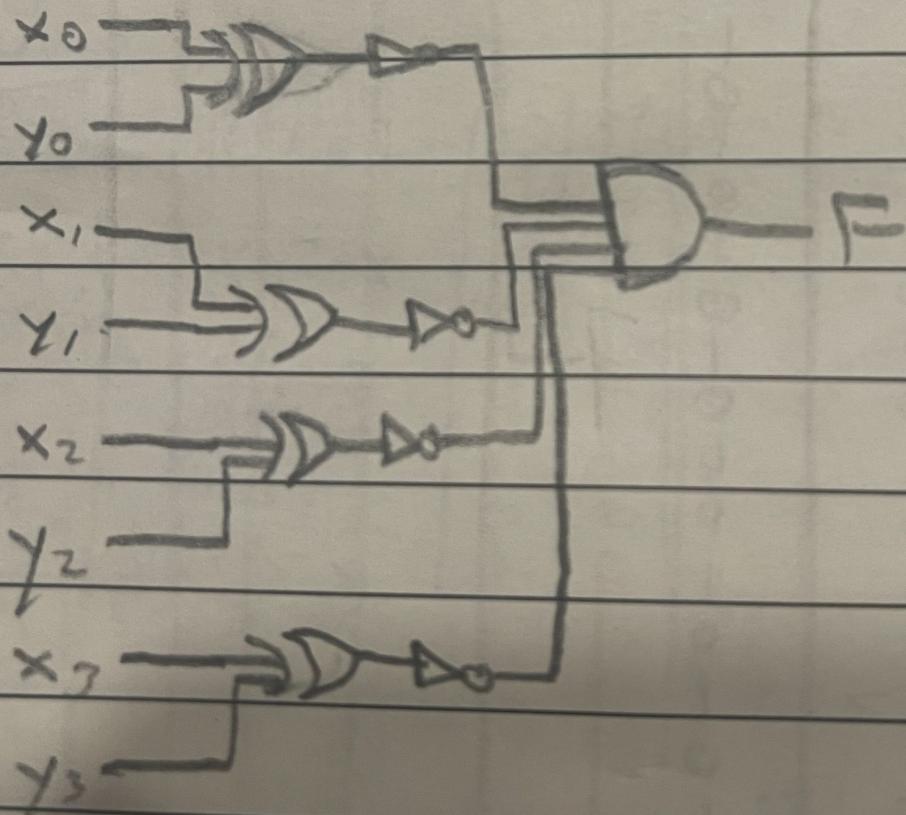
$y'z + xy$ $x'y + y'z + x'z'$
 $c = z$
 $x'z' + xz$



4.21 Circuit that compares two
4 bit numbers to check if they're
equal if equal output 1

$$P = x_0 x_1 x_2 x_3 = y_0 y_1 y_2 y_3$$

$$F = (x_0 \oplus y_0)' (x_1 \oplus y_1)' (x_2 \oplus y_2)' (x_3 \oplus y_3)'$$



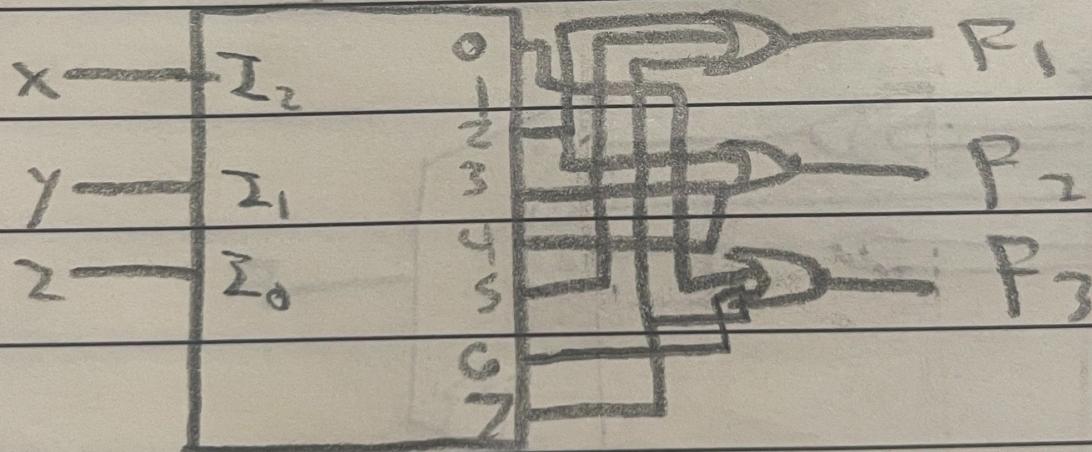
4.28

2

x	y	z	F ₁	F ₂	F ₃
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	-1	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	0	0
1	1	1	0	0	0

$$F_1 = \sum (2, 5, 7) \quad F_2 = \sum (2, 3, 4)$$

$$F_3 = \sum (0, 6, 7)$$



4.35 b 4×1 Mux

A | B | C | D | F

0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0

01101

$$I_0 = C'D + CD'$$

0	1	-0C	-0-0	0
0	1	-	-	1

$$I_1 = D$$

1	000	001	010	01010010
1	000	101	110	1

$$I_2 = C + D'$$

1	111	100	00	1001110
1	111	110	10	1

$$I_3 = D$$

C

D
P
S

