Name: Napat Sapmusri Student ID 6501131 **Sent by 30/1/2023**

The table beside is the truth table for 2-bit addition.

The inputs are the augend, A_1 A_0, and the addend, B_1 B_0.

The outputs are the sum S_1 S_0 and the carry C_1

Get the remainder of the quotients of the last number in your student ID and 3. Use it to define the outputs Y_1, Y_2 and Y_3 for doing homework. For example, if remainder =2, then $Y_1 = S_0$, $Y_2 = C_0$ and $Y_3 = S_1$.

Output / Remainder	Y_1	Y_2	Y_3
0	C_1	S_1	S_0
1	S_1	S_0	C_1
2	S_0	C_1	S_1

R 1

	INPUTS			OUTPUTS		
A_1	A_0	B_1	B_0	C_1 y_3	S_1 y_1	S_0 y_2
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

1) Use the Boolean Algebra to simplify the equation for

Y_1 = S_1

$\bar{A}_1\bar{A}_0B_1\bar{B}_0 + \bar{A}_1\bar{A}_0B_1B_0 + \bar{A}_1A_0\bar{B}_1B_0 + \bar{A}_1A_0B_1\bar{B}_0 + A_1\bar{A}_0\bar{B}_1\bar{B}_0 + A_1\bar{A}_0\bar{B}_1B_0 + A_1A_0\bar{B}_1\bar{B}_0 + A_1A_0B_1B_0$

$\bar{A}_1\bar{A}_0B_1 + A_1\bar{A}_0B_1 + \bar{A}_1A_0 + A_1A_0$

$\bar{A}_0B_1 + A_0$

S_0

2) Use the Karnaugh's Map to minimize the Y_2 and Y_3.

A_1A_0 \ B_1B_0	$\bar{B}_1\bar{B}_0$	$\bar{B}_1B_0$	B_1B_0	$B_1\bar{B}_0$
$\bar{A}_1\bar{A}_0$	0	1	1	0
$\bar{A}_1A_0$	1	0	0	1
A_1A_0	1	0	0	1
$A_1\bar{A}_0$	0	1	1	0

Y_2 = $\bar{B}_1\bar{B}_0A_0 + B_1\bar{B}_0A_0 + \bar{A}_1\bar{A}_0B_0 + A_1\bar{A}_0B_0$

C_1

A_1A_0 \ B_1B_0	$\bar{B}_1\bar{B}_0$	$\bar{B}_1B_0$	B_1B_0	$B_1\bar{B}_0$
$\bar{A}_1\bar{A}_0$	0	0	0	0
$\bar{A}_1A_0$	0	0	1	0
A_1A_0	0	1	1	1
$A_1\bar{A}_0$	0	0	1	1

Y_3 = $A_1A_0B_0 + B_1B_0A_0 + A_0B_1$