

Lawrence Chen
Homework 5

Due: 10/16/2016 @ 11:59 pm

① when S, S_0, C_{in} is

$(111)_2, (110)_2, (101)_2, (100)_2, (011)_2,$

$(001)_2$, and $(000)_2$. What is the output of $Cout, D_3, D_2, D_1, D_0$

respectively? Assuming that $A_3 A_2 A_1 A_0$ is $(1100)_2$, $B_3 B_2 B_1 B_0$ is $(0101)_2$.

$A_3 A_2 A_1 A_0$				$B_3 B_2 B_1 B_0$				C_{in}	S_1	S_0	$Cout, D_3, D_2, D_1, D_0$					<u>Output</u> $Cout, D_3, D_2, D_1, D_0$				
1	1	0	0	0	1	0	1	1	1	1						1	1	1	0	0
1	1	0	0	0	1	0	1	1	1	0						0	1	1	0	1
1	1	0	0	0	1	0	1	1	0	1						1	0	1	1	1
1	1	0	0	0	1	0	1	1	0	0						1	0	0	1	0
1	1	0	0	0	1	0	1	0	1	1						1	1	0	1	1
1	1	0	0	0	1	0	1	0	0	0						0	1	1	0	0
1	1	0	0	0	1	0	1	0	0	1						1	0	1	1	0
1	1	0	0	0	1	0	1	0	0	0						1	0	0	0	1

Full Adder

X	Y	C_{in}	$Cout, D$	
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

- Full adder truth table was used to figure out the full adder on the circuit.

- ② Given the following 8 logic microoperations, please complete the functions of the remaining 8 logic microoperations. Assuming that A and B are 1-bit registers.

Results of Boolean Operation	Microoperation	Function
1 0 0 0	$F \leftarrow A \vee B$	NOR
1 0 0 1	$F \leftarrow \overline{A \oplus B}$	XNOR
1 0 1 0	$F \leftarrow B$	Transfer B'
1 0 1 1	$F \leftarrow A \wedge B$	
1 1 0 0	$F \leftarrow A$	Transfer A'
1 1 0 1	$F \leftarrow \overline{B} \wedge A$	
1 1 1 0	$F \leftarrow \overline{A \wedge B}$	NAND
1 1 1 1	$F \leftarrow 1$	Load

The above functions are mirrored from 0000 \rightarrow 1111 except it's their inverses. Example:

$\left\{ \begin{array}{l} 0001 \quad F \leftarrow \text{AND} \quad A \wedge B \\ 1110 \quad F \leftarrow \text{NAND} \quad \overline{A \wedge B} \end{array} \right.$

$\left\{ \begin{array}{l} 0000 \leftarrow F \leftarrow 0 \quad \text{Clear} \\ 1111 \leftarrow F \leftarrow 1 \quad \text{Load} \end{array} \right.$