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CSC137-4 Haney
Adder/Mux

HW #3

1) Design a Single Cell - 1 bit Carry propagate (Ripple Carry Adder) full adder.
(a) Generate the truth table.
(b) Using K-map, determine the logical expression for carry out (C-out) and Sum (S).
(c) Based on the logical expression, create the ~~same~~ schematic diagram for full adder.

(a)

A	B	Cin	Sum	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

(b)

A \ BCin	00	01	11	10
0	0	(1)	0	(1)
1	(1)	0	(1)	0

Sum

$Sum = \bar{A}\bar{B}Cin + \bar{A}B\bar{Cin} + A\bar{B}\bar{Cin} + ABCin$

$= \bar{A}(\bar{B}Cin + B\bar{Cin}) + A(\bar{B}\bar{Cin} + BCin)$

$= \bar{A}(B \oplus Cin) + A(B \odot Cin)$

$= \bar{A}(B \oplus Cin) + A(\overline{B \oplus Cin})$

$Sum = A \oplus B \oplus Cin$

A \ BCin	00	01	11	00
0	0	0	(1)	0
1	0	(1)	(1)	(1)

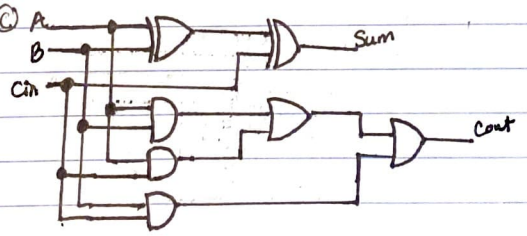
Cout

$Cout = ABC + AB\bar{C} + A\bar{B}C + \bar{A}BC$

$= AB + (A\bar{B} + \bar{A}B)C$

$Cout = AB + (A \oplus B)C$

(c)



2) Design a 1 bit, 2 to 1 multiplexer (Mux). outputs Y when S=0 ; X when S=1

(a) Generate the truth table

(b) Using K-map, determine the logical expression for output.

(c) Based on the logical expression, create the schematic diagram for Mux.

(a)

S	I_1	I_0	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(b)

Y	$\bar{I}_1\bar{I}_0$	$\bar{I}_1 I_0$	$I_1 I_0$	$I_1\bar{I}_0$
$\bar{S}$	0	1	1	0
S	0	0	1	1

$y = \bar{S}I_0 + SI_1$

(c)