

Homework #5

1) Design a single cell-1 bit carry propagate full adder

a)

x	y	C _{IN}	S	C _{OUT}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
1	0	0	1	0
1	1	0	0	1
1	0	1	0	1
0	1	1	0	1
1	1	1	1	1

$$S = \bar{x}\bar{y}C_{in} + \bar{x}y\bar{C}_{in} + x\bar{y}\bar{C}_{in}$$

$$C_{out} = xy\bar{C}_{in} + x\bar{y}\bar{C}_{in} + \bar{x}yC_{in} + xyC_{in}$$

b) K-map

S

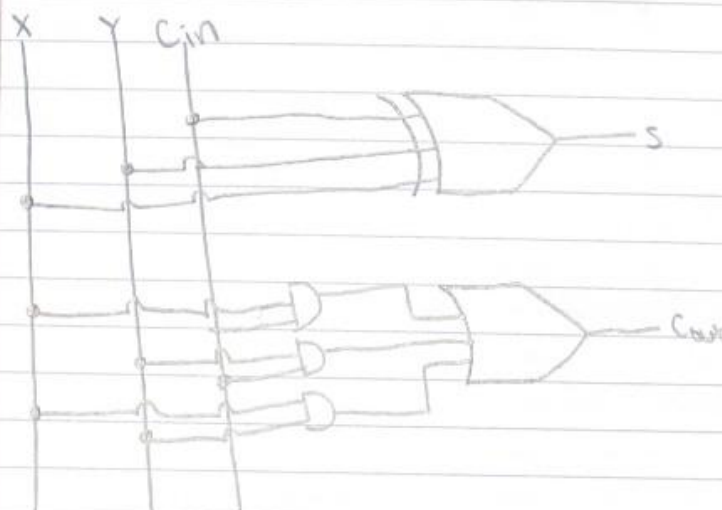
x \ y C _{in}	C ₁	C ₂	C ₃	C ₄
	00	01	11	10
C ₁ 0		1		1
C ₂ 1	1		1	

C_{out}

x \ y C _{in}	C ₁	C ₂	C ₃	C ₄
	00	01	11	10
C ₁ 0			1	
C ₂ 1		1	1	1

$$S = x \oplus y \oplus C_{in}$$

$$C_{out} = \underset{\text{imp-1}}{xC_{in}} + \underset{\text{imp-2}}{yC_{in}} + \underset{\text{imp-3}}{xy}$$



2) Design a 1-bit, 2 to 1 multiplexor outputs Y when $S=0$, x when $S=1$

a) S x Y 00x

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 -

$$F = \bar{S}\bar{x}y + \bar{S}xy + Sx\bar{y} + Sxy$$

b) Kmap

S \ xy	00	01	11	10
0	0	1	1	1
1	0	0	1	1

$$F = \bar{S}y + Sx$$

c) Schematic diagram

