D0011E - Assignment 1

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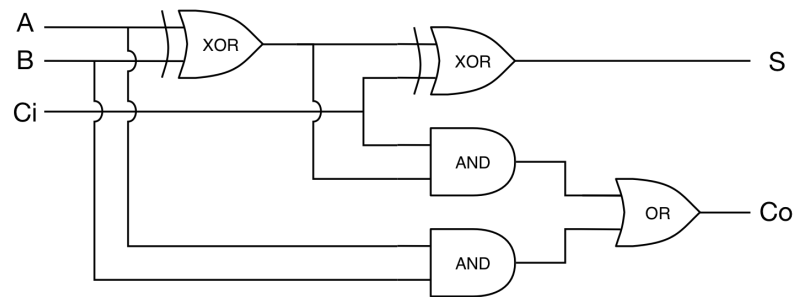## 1 Part 1 - 1 bit full adder

Figure 1: 1 bit Full Adder

2   Part 2 - Ripple-carry 4 bit adder
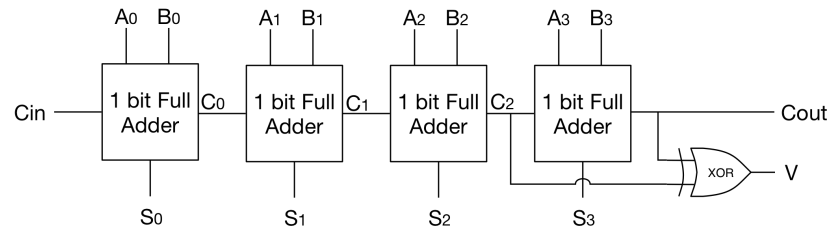

Figure 2: 4 bit ripple-carry adder

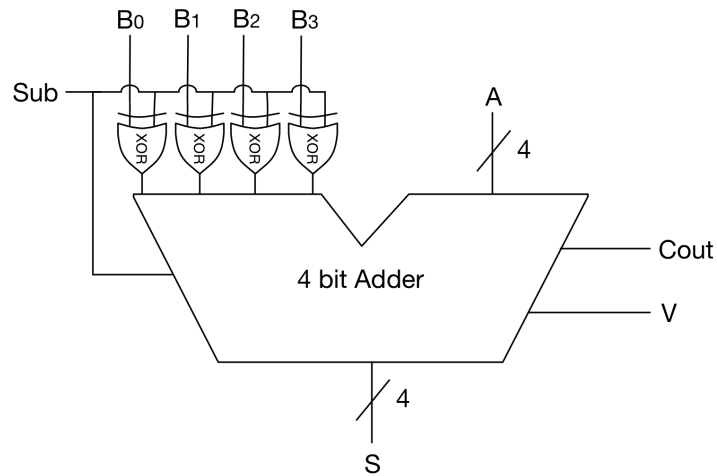## 3   Part 3 - 4 bit addition and subtraction unit

Figure 3: 4 bit addition and subtraction unit

A Decimal	A Binary	B Decimal	B Binary	S Decimal	S Binary	Subtraction (Sub)	Overflow (V)	Carry (C)
4	0100	3	0011	7	0111	0	0	0
7	0111	2	0010	-7	1001	0	1	0
7	0111	2	0010	5	0101	1	0	1
0	0000	-8	1000	-8	1000	1	1	0

Table 1: 4 examples of 4 bit addition and subtraction unit with signed integers
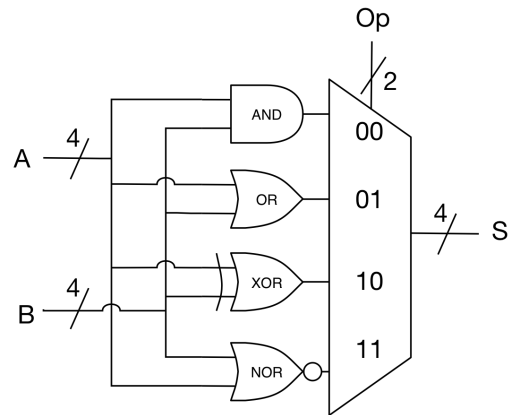
4   Part 4 - 4 bit logic unit

Figure 4: 4 bit logic unit

5   Part 5 - Arithmetic logic unit

SUB	ALUC 0	ALUC 1	Instruction
X	0	0	AND
X	0	1	OR
0	1	0	ADD
0	1	1	-
1	1	0	SUB
1	1	1	SLT

Table 2: Truth table of arithmetic logic unit