ENEL 353 Section 02 Lecture

Wed Sept 11 2019

Set 1, Slide 22

Octal - pad with 0 to get groups of 3 bits.

$\underbrace{011}\underbrace{010} = 32_8$

Hex - pad with 0 to get groups of 4 bits

$\underbrace{0001}\underbrace{1010} = 1A_{16}$

$153_8 = \underbrace{001}_{1}\underbrace{101}_{5}\underbrace{011}_{3}{}_2 = 1101011_2$

$5D_{16} = \underbrace{0101}_{5}\underbrace{1101}_{D} = 1011101_2$

487_{10} - let's convert to hex first

division	quotient	remainder	
487/16	30	7	↑ read up
30/16	1	14	
1/16	0	1	

$487_{10} = 1E7_{16}$

octal $1E7_{16} = \underbrace{0001}_{1}\underbrace{1110}_{E}\underbrace{0111}_{7} = 747_8$

$\underbrace{0001}_{0}\underbrace{1110}_{7}\underbrace{0111}_{4}\underbrace{}_{7}$

Unsigned binary addition (Slide 32)

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carry in	1 1 0 0
	0 1 1 1
	0 1 1 0
sum	1 1 0 1 $_2$

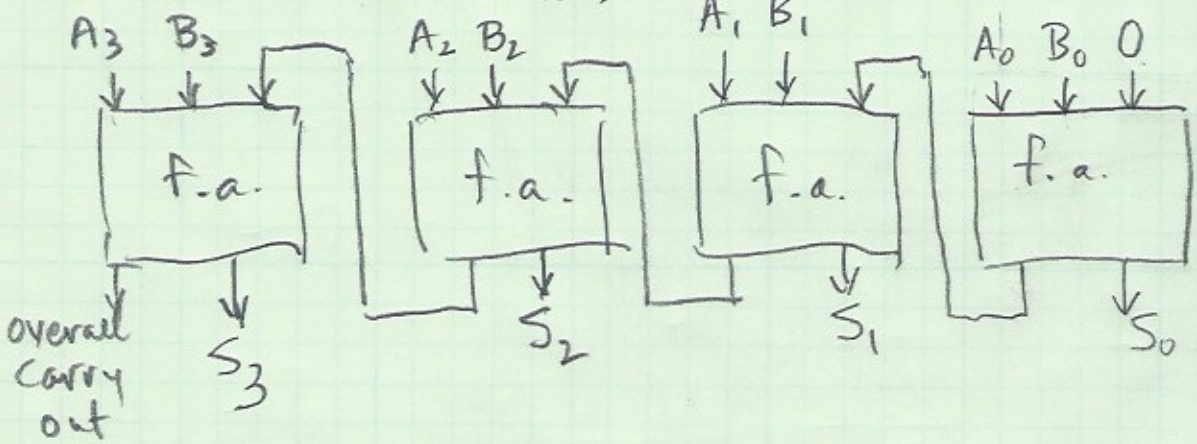
Slide 34 Complete rules for 1 column of binary addition ...

A	B	C_{in}	C_{out}	S
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

This is an example of a truth table.

A 4-bit full adder (Slide 36)

We need 4 full adders



Slide 39

```
carry in   1 1 0 0
           1 0 1 1
           0 1 1 0
           -------
sum        0 0 0 1
```

There is an overall carry-out of 1, but there is no place for it in the 4-bit sum.

Apparently, $11_{10} + 6_{10} = 1_{10}$!

Sign/magnitude examples (Slide 44)

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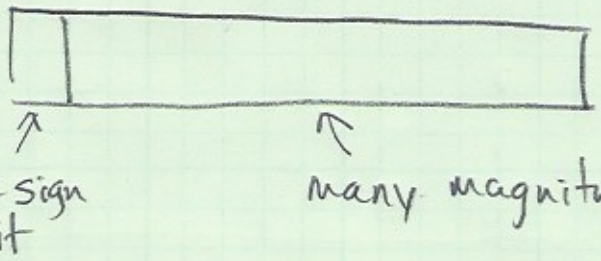
Format



$+10_{10}$ and -10_{10} in 5-bit sign/magnitude

$+10_{10}$: 01010 -10_{10}: 11010

same numbers in 8-bit sign/magnitude

$+10_{10}$: 0 0001010 -10_{10}: 1 0001010

0 = sign; 0001010 = magnitude

1 = sign; 0001010 = magnitude