# Redundant CORDIC
# Noll

20161022

CSA

doubling of each element of the sequence is not necessary

( # of the inspected digits
# of angle elements which have to be doubled

$p = 3$ or $4$ MSD's
→ typically only each second sequence element has to be doubled

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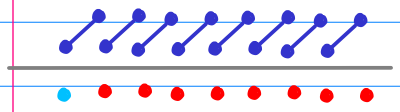
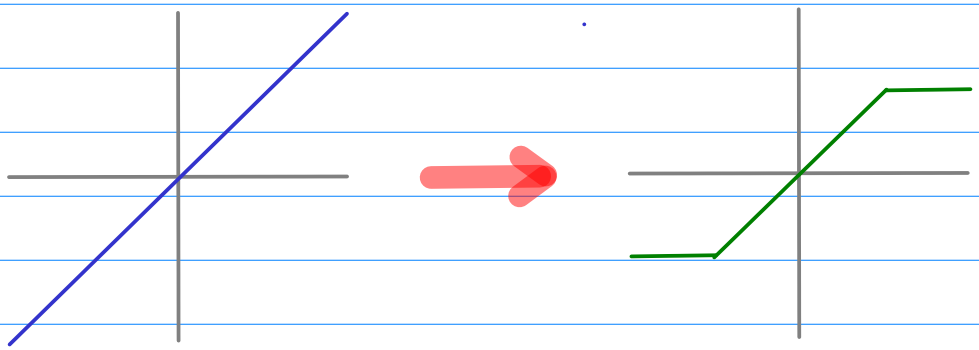
# VMA (Vector Merging Adder)



final stage adder

CP (Carry Propagation) Adder

## Level slicing problem



In the redundant number system

ⓐ exact comparison

VMA may be used

ⓑ magnitude estimation

by inspecting only a few MSD

(Most Significant Digits)

Carry-save arithmetic for high speed digital signal processing, Noll,1990

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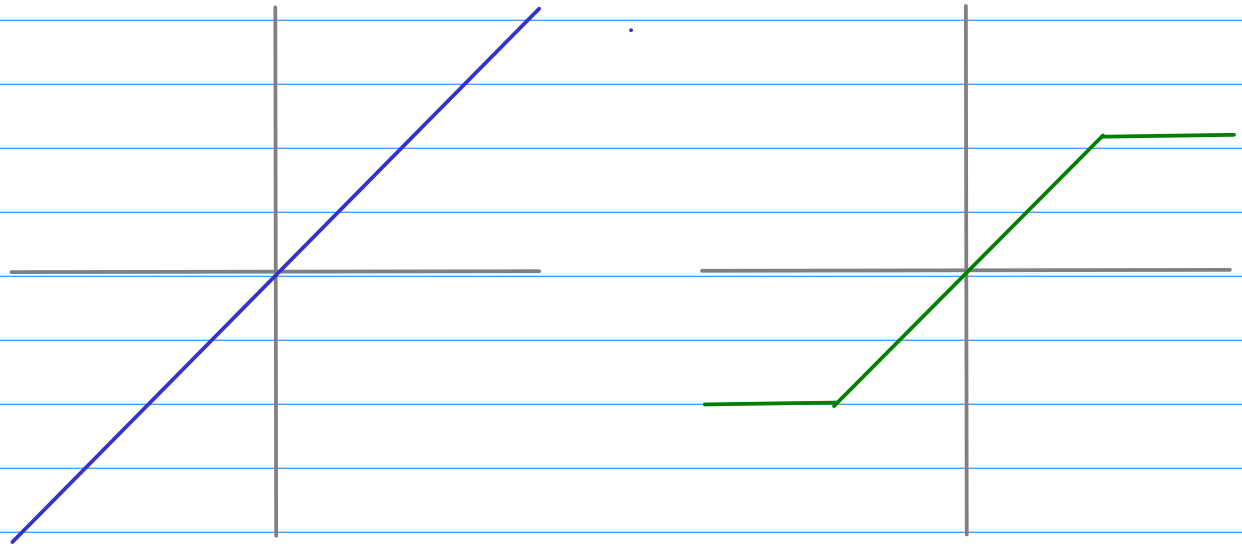

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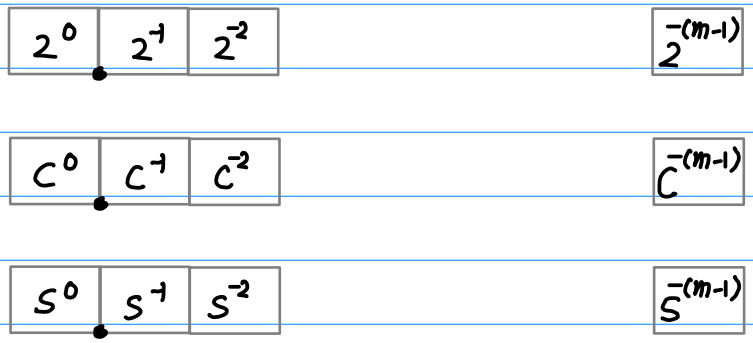


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a positive saturation

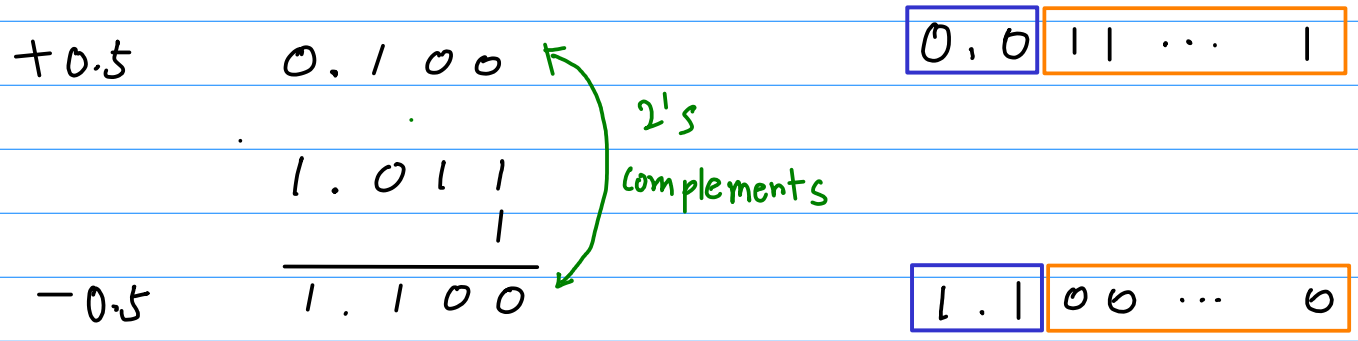
$c = 0.000\cdots0$

$s = 0.011\cdots1$

a negative saturation

$c = 0.000\cdots0$

$s = 1.100\cdots0$



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positive saturation conditions

| | | |
|---|---|---|
| C | 0, 1 | |
| S | 0, 0 | |

| | | |
|---|---|---|
| C | 0, 0 | |
| S | 0, 1 | |

| | | |
|---|---|---|
| C | 0, 1 | |
| S | 0, 1 | |

negative saturation conditions

| | | |
|---|---|---|
| C | 1, 0 | |
| S | 1, 1 | |

| | | |
|---|---|---|
| C | 1, 1 | |
| S | 1, 0 | |

| | | |
|---|---|---|
| C | 1, 0 | |
| S | 1, 0 | |

positive saturation value

| | |
|---|---|
| 0, 0 | 1 1 ··· 1 |

negative saturation value

| | |
|---|---|
| 1 . 1 | 0 0 ··· 0 |

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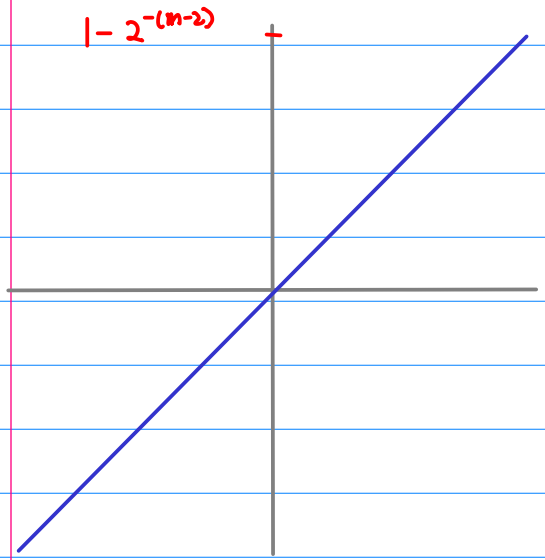
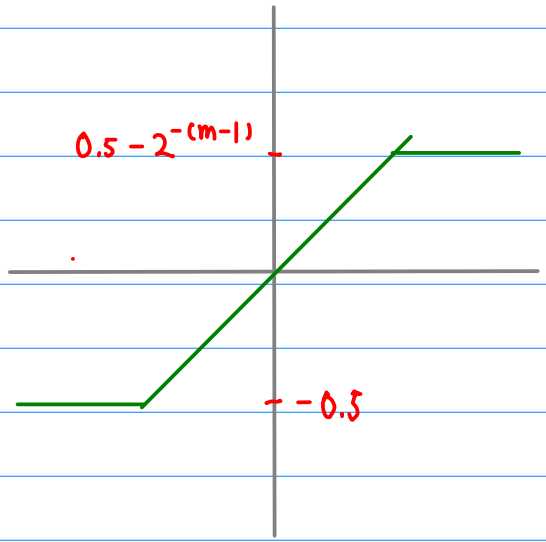
0.5 [0,1][0 0 ··· 0]

[0,0][1 1 ··· 1] $0.5 - 2^{-(m-1)}$

−0.5 [1.1][0 0 ··· 0]

[1.1][0 0 ··· 0] −0.5

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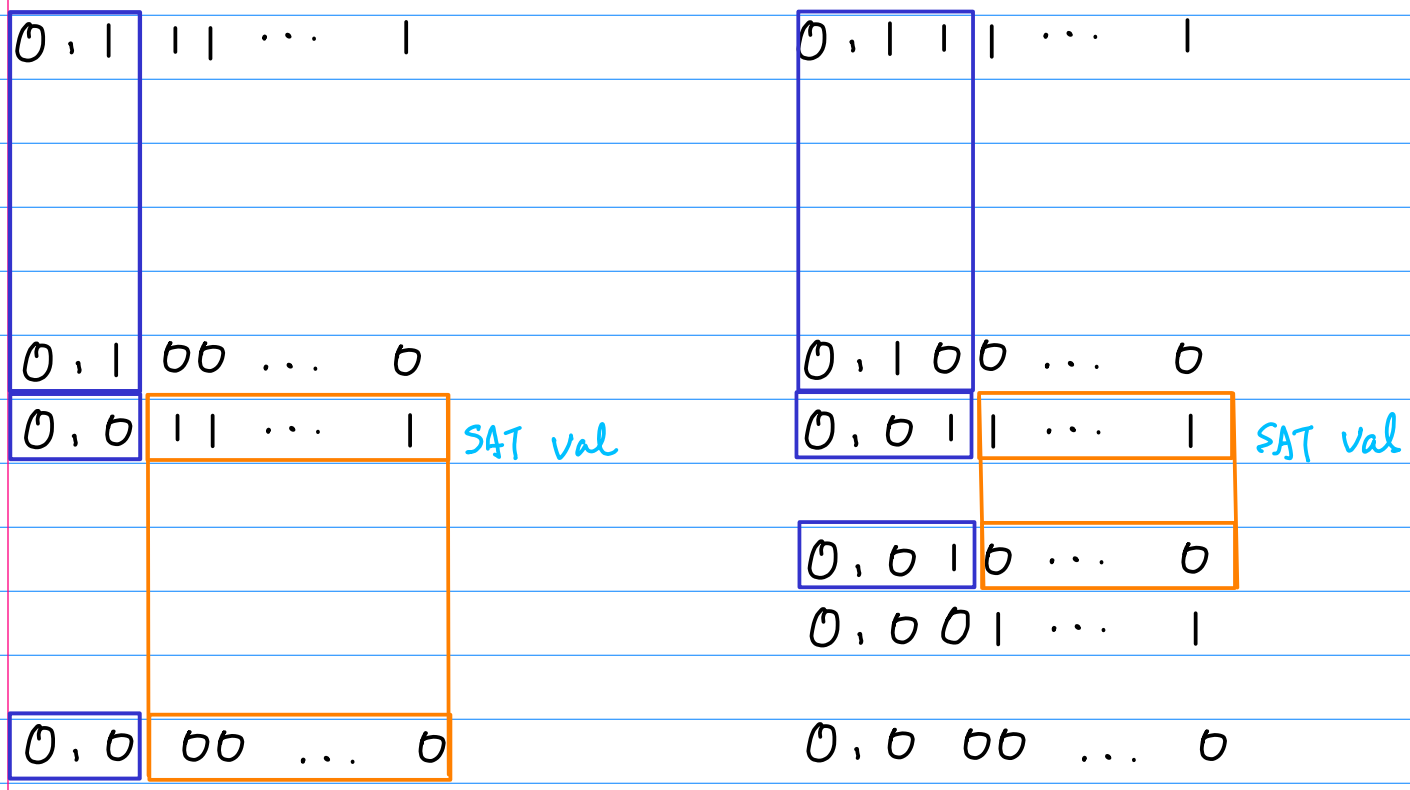


Carry-save arithmetic for high speed digital signal processing, Noll,1990