

| $a_1 a_0 b_1 b_0$ | A_{nat} | B_{nat} | S_{nat} | $A+B_{nat}$ | 3rd bit out $C \ S_2 \ S_1$ | | | A_{C_2} | B_{C_2} | $A_{C_2} + B_{C_2}$ | S_{C_2} | overflow | 3rd bit C_2 (correct) Sign | $a_1 b_1 S_1$ | Carry |
|-------------------|-----------|-----------|-----------|-------------|--------------------------------|---|---|-----------|-----------|---------------------|-----------|----------|------------------------------------|---------------|-------|
| 0000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 000 | 0 |
| 0001 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 000 | 0 |
| 0010 | 0 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | -2 | -2 | -2 | 0 | 1 | 000 | 0 |
| 0011 | 0 | 3 | 3 | 3 | 0 | 1 | 1 | 0 | -1 | -1 | -1 | 0 | 1 | 000 | 0 |
| 0100 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 001* | 0 |
| 0101 | 1 | 1 | 2 | 2 | 0 | 1 | 0 | 1 | 1 | 2 | *-2 | 1 | 1 | 001* | 0 |
| 0110 | 1 | 2 | 3 | 3 | 0 | 1 | 1 | 1 | -2 | -1 | -1 | 0 | 1 | 011 | 0 |
| 0111 | 1 | 3 | 0 | *4 | 1 | 0 | 0 | 1 | -1 | 0 | 0 | 0 | 1 | 101 | 0 |
| 1000 | 2 | 0 | 2 | 2 | 0 | 1 | 0 | -2 | 0 | -2 | -2 | 0 | 1 | 101* | 1 |
| 1001 | 2 | 1 | 3 | 3 | 0 | 1 | 1 | -2 | 1 | -1 | -1 | 0 | 1 | 110* | 1 |
| 1010 | 2 | 2 | 0 | *4 | 1 | 0 | 0 | -2 | -2 | -3 | *1 | 1 | 1 | 110* | 0 |
| 1011 | 2 | 3 | 1 | *5 | 1 | 0 | 1 | -2 | -1 | -1 | -1 | 0 | 1 | 101 | 1 |
| 1100 | 3 | 0 | 3 | 3 | 0 | 1 | 1 | -1 | 0 | 0 | 0 | 0 | 0 | 100 | 1 |
| 1101 | 3 | 1 | 0 | *4 | 1 | 0 | 0 | -1 | 1 | 0 | *1 | 1 | 1 | 110* | 1 |
| 1110 | 3 | 2 | 1 | *5 | 1 | 0 | 1 | -1 | -2 | -3 | *1 | 1 | 1 | 111 | 1 |
| 1111 | 3 | 3 | 2 | *6 | 1 | 1 | 0 | -1 | -1 | -2 | -2 | 0 | 1 | 111 | 1 |

SEMPTRE A 2 BIT PER INTERI CON SENZA SEGNO

| $a_1 b_1$ | S_1 | Carry |
|-----------|-------|-------|
| 00 | 0 | 0 |
| 01 | 1 | 0 |
| 11 | 1 | 1 |
| 10 | 1 | 0 |

| $a_1 b_1$ | S_1 | Sign |
|-----------|-------|------|
| 00 | 0 | 0 |
| 01 | 0 | 1 |
| 11 | 1 | 1 |
| 10 | 0 | 1 |

3rd bit for C_2 (sign) = $S_1 \oplus \text{overflow}$
 $= (a_1 \oplus b_1) \cdot \text{Carry} + (a_1 \oplus b_1) \overline{\text{Carry}}$
 $= a_1 \oplus b_1 \oplus \text{Carry}$

$\text{overflow} = \overline{a_1} b_1 S_1 + a_1 b_1 \overline{S_1}$
 ancora: $\text{sign} = a_1 b_1 + b_1 S_1 + a_1 S_1$
 $\text{Carry} = a_1 b_1 + b_1 \overline{S_1} + a_1 \overline{S_1}$
 e ancora: $\text{sign} = (\overline{a_1} \oplus b_1) \text{Carry} + (a_1 \oplus b_1) S_1$

| $a_1 b_1 S_1$ | sign | overflow | Carry | Carry |
|---------------|------|----------|-------|-------|
| 000 | 0 | 0 | 0 | 1 |
| 001 | 0 | 1 | 0 | 1 |
| 010 | 0 | 0 | 1 | 0 |
| 011 | 1 | 0 | 0 | 0 |
| 100 | 0 | 0 | 0 | 0 |
| 101 | 1 | 1 | 0 | 0 |
| 110 | 1 | 1 | 1 | 0 |
| 111 | 1 | 0 | 1 | 1 |

$(a_1 a_0)_{C_2} = -2^4 \cdot a_1 + 2^0 \cdot a_0$

| | | |
|------|---|---|
| 2120 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 1 |

Lu. S. Lunardi 13/10/14