Exercise TP1

1) a 1000 0000 S/M = −0

b 1000 0000 1s'C, invert signal: 0111 1111 = +127
so 1000 0000 was −127

c 1000 0000 $= -1 \times 2^7 + 0 \times 2^6 = -128$

d 1000 0000 S/M → 0000 0000
1sC → 0111 1111
2'sC → not possible !!

2)

		+234 (10)	−234 (10)
BASE 2	unsign.	000 0000 1110 1010	not possible
	S/M	0000 0000 1110 1010	1000 0000 1110 1000
	1s'C	0000 0000 1110 1010	1111 1111 0001 0101
	2'sC	0000 0000 1110 1010	1111 1111 0001 0110
BASE 16	unsign.	0 0 E A	not possible
	S/M	0 0 E A	F 0 E A
	1s'C	0 0 E A	F F 1 5
	2s'C	0 0 E A	F F 1 6

3) ASCII: 'A'=65, 'B'=66, 'a'=97, 'C'=67
'a'−'B'+'C' = 97 − 66 + 67 = 98 = 'b'.

4) a 120 = 64 + 32 + 16 + 8 = 0111 1000
−120 (2'sC) = 1000 1000
23 = 16 + 4 + 2 + 1 = 0001 0111 +
1001 1111
= −128 + 16 + 8 + 4 + 2 + 1 = −97

b +6 = 0110
−6 = 1001 (1s'C)
1 = 0001 +
1010 = −5

5) 87.21

87 / 8 → 10 | 7 ; 1 / 8 → 1 | 2 ; 1 / 8 → 0 | 1 ; 127 (8)

.21 × 8 = 1.68 ; .68 × 8 = 5.44 ; .44 × 8 = 3.52 ; 0.1534.... (8) never stops.

6) 5444 base 6 S/M

$= -(4\times6^2 + 4\times6 + 4) = -172\,(10)$

0444 (6) $= +172\,(10)$

5s'-compl. : 5111 (6) $= -172\,(10)$

$\underline{\quad\quad 1 +}$

6's compl : 5112 (6) $= -172\,(10)$

7) $123\,(5) = 1\times5^2 + 2\times5^1 + 3\times5^0 = 38\,(10)$

38 / 6 → 6 | 2 ; 1 / 6 → 1 | 0 ; 1 / 6 → 0 | 1 ; $102\,(6) = 1\times6^2 + 2\times6^0 = 38\,(10)$

Direct

	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	10	12	14
3	0	3	10	13	20	23
4	0	4	12	20	24	32
5	0	5	14	23	32	41

MUL TABLE

	0	1	2	3	4	5
0	0	1	2	3	4	5
1	1	2	3	4	5	10
2	2	3	4	5	10	11
3	3	4	5	10	11	12
4	4	5	10	11	12	13
5	5	10	11	12	13	14

ADD TABLE

$123\,(5) = 1\times5^2 + 2\times5 + 3$

$= 41\,(6) + 14\,(6) + 3\,(6)$

from MUL TABLE

11 ← carry

41

14

3 +

102 (6)

from ADD TABLE