Q1. Num Conversion

1. $973D4_{16}$

$16^4\ 16^3\ 16^2\ 16^1\ 16^0$

$(9\cdot16^4)+(7\cdot16^3)+(3\cdot16^2)+(13\cdot16^1)+(4\cdot16^0)$

$=619,476$

2. 987654321

987654321 ÷16 (1)
61728395 ÷16 (11)-B
3858024 ÷16 (8)
241126 ÷16 (6)
15070 ÷16 (14)-E
941 ÷16 (13)-D
58 ÷16 (10)-A
3 ÷16 (3)
0 ÷16

$=3ADE68B1$

3. $C5FE_{16}$

C 5 F E
1100 0101 1111 1110] binary

$1100\ 0101\ 1111\ 1110_2$] convert into groups of 3
~~0011 0100 0000 0001~~ ~~(0→1) (1→0)~~

001 100 010 111 111 110
1 4 2 7 7 6

$=142776_8$

4. ~~128~~ 125715_8

1 2 5 7 1 5
001 010 101 111 001 101

$001\ 010\ 101\ 111\ 001\ 101_2$

0001 0101 0111 1001 1010
1 5 7 9 10

$=1579A_{16}$

Q2. Two complement

1. -102

102 ⌐

~~one's comp~~ (Two's complement)

01100110 ↷ 10011001

+ 1

10011010

1001 1010

9 10(A)

$= 9A_{16}$

-87

87 ⌐

01010111 ↷ 10101000

+ 1

10101001

1010 1001

10(A) 9

$= A9_{16}$

2. a. $9A_{16} + A9_{16}$

1001 1010

+

1010 1001

~~1~~ 0100 0011 ← stack overflow

= 0100 0011

4 3

= 43

b. The answer is not agurate because there has been a stack overflow.

It went from 9 → 8bits which has an effect on the calculations.

Q3 floating point numbers.

1.

a. -69/32

= -2.15625

10

.15625 · 2 (0)
.3125 · 2 (0)
.625 · 2 (1)
.25 · 2 (0)
.5 · 2 (1)

$= 0.00101_2$

b. 13.625

13 ÷ 2 (1)
6 ÷ 2 (0)
3 ÷ 2 (1)
1 ÷ 2 (1)

=1101

0.625 · 2 (1)
0.25 · 2 (0)
0.5 · 2 (1)
0

=0.101

$= 1101,101 = 1.101101 \times 2^3$

S E M

0 10000010 10110100000000000000000

4 1 5 10 (A) 0 0 0 0 0 0

=415A0000₁₆

Sign Exponent Mantissa

(-) = 1 1+127=128. $00010100000000000000000_2$

1 10000000_2

A-10
B-11
C-12

1100 0000 0001 0100 0000 0000 0000 0000

12 0 0 10 0 0 0 0

=C00A0000₁₆

2.

a. 42E48000

0100 0010 1110 0100 1000 0000 0000 0000

1 8 23

$= 1.11001001 \times 1 \times 1.7109375 \times 2^6$

$= 1.7109375 \times 64$

= 109.5

b. C6F00040

1100 0110 1111 0000 0000 0000 0100 0000

1 8 23

$= 1.111100000$

$= (-1)^1 \times 1.875 \times 2^{14}$

$= -1 \times 1.875 \times 16384$

= -30720