module 2)

3.1) 5 E D 4 − 0 7 A 4 = 5 7 3 0

0101 1110 1101 0100 0000 0111 1010 0100 = 0101 0111 0011 0000

3.2) 5 E D 4 0101 1110 1101 0100

− 07 A4 ~~+1+1R 1000 0101 1100~~

0000 0111 1010 0100

sign bit not set so calculation same as above

~~4 → 0100 → 1011 + 1 = 1100~~

~~A → 1010 → 0101~~

3.3) 5 E D 4 0101 1110 1101 0100

Each hexadecimal number = 4 bits. Saves time and space. 1 byte = 2 hexa digits

3.4) 4365 → $4 \cdot 8^3 + 3 \cdot 8^2 + 6 \cdot 8^1 + 5 \cdot 8^0$

− 3412 → $3 \cdot 8^3 + 4 \cdot 8^2 + 1 \cdot 8^1 + 2 \cdot 8^0$

2293 − 1802 = 491 = $\boxed{0753_8}$

3.5) 4365 → 0100 0011 0110 0101 → 2293

− 3412 → 0011 0100 0001 0010 → 1802

0000 0111 0101 0011 → 491 $\boxed{0753_8}$ (base 8)

3 + 40 + 60.7 = 491

Encoded oct 4365

Bin 100 011 110 101

Sign 1

Magnitude Bin 00 011 110 101

Oct 365

3.6) 185 = 128 + 32 + 16 + 8 + 1 = 10111001

122 = 64 + 32 + 16 + 8 + 2 = 122 = 01111010

$\boxed{00111111 \quad \text{neither}}$

10111001

− 01111010

111011

1 1 1 1 0 1 0

64 32 16 8 4 2 1

122 − 64 = 58 − 32 = 26 − 16 = 10 − 8

3.7) 185 10111001

122 01111010

$\boxed{100110011 \quad \text{overflow}}$

3.5

	binary	decimal
4365	011 110 ~~101~~	→ −245
3412	011 100 001 010	→ 1802

oct 4365, dec −245

	binary				dec
4365	100	011	110	101	−245
3412	011	100	001	010	→ 1802

sum 1557 → ~~binary octal~~

how do I convert to octal?

octal $\boxed{3777}$

3,8) A 185   10111001 → −57
−B 122   01111010 → 122

-57
-122
too small → -179

$\boxed{\text{underflow}}$ ~~underflow~~ ~~overflow~~

signed (look at hints) in module 2   ~~10101010111~~ ~~00111111~~ ~~neither~~ ~~neither~~

185 in binary
1 0 1 1 1 0 0 1
128 64 32 16 8 4 2 1
185
128
57
32
25

decimal → binary conversion
214 → 1 1 0 1 0 1 1 0
128 64 32 16 8 4
214
128
86
64
22
16

3,9)

	binary	two's	decimal
214	11010110	00101001 → 00101010	−105
151	10010111	01101000 → 01101001	−42

A 00101010
01101001
10010011 ← −147 ?   Sum of two positive numbers = negative $\boxed{\text{so overflow}}$

3,10) A−B 151 − 214

	Binary	twos complement
151	10010111	01101000 +1 ⇒ 01101001
214	11010110	00101001 +1 ⇒ 00101010

$\boxed{00111111}$ → 63 → −63

3,11]

	binary
151	10010111
214	11010110

add 1)01101101 ← 365 ~~232?~~ $\boxed{\text{overflow}}$ ~~neg~~ ~~not right~~

3,32) A. $3.984375 \times 10^{-1} = 1.1001100000 \times 2^{-2}$ (see side note) $A + B = 10.111100000 \times 2^{-2}$
B. $3.4375 \times 10^{-1} = 1.0110000000 \times 2^{-2}$ or $1.0111100000 \times 2^{-1}$
C. $1.771 \times 10^{3} = 1.1011101011 \times 2^{10}$ +C

$0.00000000001011111000.00 \times 2^{10}$
$+\ 1.1011101011 \times 2^{10}$
$1.1011101011|101$ ← guard

round
$1.1011101100 \times 2^{10}$

$\boxed{= 11011101100_2 = 1772}$

side note
3.984375×10^{-1}
$= 0.3984375$ ← convert to decimal
$= \frac{51}{128} = \frac{110011}{2^7} = 110011 \times 2^{-7}$
$= 1.10011 \times 2^{-2}$

3.33) $3.984375 \times 10^{-1} = 0.3984375$ in decimal $\rightarrow \frac{51}{128} = \frac{110011}{2^7} = 110011 \times 2^{-7}$

$= 1.10011 \times 2^{-2}$

$3.4375 \times 10^{-1} = .34375$ in decimal $\rightarrow \frac{11}{32} = \frac{1011}{2^5} = 1011 \times 2^{-5}$

1.011×2^{-2}

$1.771 \times 10^3 = 1771$ in decimal $= 1.10111010 11 \times 2^{10}$

1	1	0	1	1	1	0	1	0	1	1
1024	512	256	128	64	32	16	8	4	2	1

1771
1024
747
512
235
128
107
64
43
32
11

1	1	1	0	0	1	0
64	32	16	8	4	2	1

114
64
50
32
18
16
2

25 to binary

1	1	0	0	1
16	8	4	2	1

$3.4375 \times 10^{-1} \rightarrow 1.011\,0000000 \times 2^{-2}$

$+\ 1.771 \times 10^3 \rightarrow 1.1011101011 \times 2^{10}$

$0.0000000000001.011 \times 2^{10}$

$+\ 1.1011101011\,00000 \times 2^{10}$

$1.1011101011\,01011 \times 2^{10}$

$+\ 0.0000000000\,0110011 \times 2^{10}$

10th bit

$1.10011 \times 2^{-2} \rightarrow 2^{10}$

$.0.0.0.0.0.0.0.0.0.0.001.10011$

$\boxed{1.10111010110 \times 2^{10}}$

$= 11011101011_2$

$= \boxed{1771}$

3.34) It does not equal, Not associative.