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Assignment 3

1) convert [161] into binary and hex:decimal  
(unsigned)

a)

161/2	80	1
80/2	40	0
40/2	20	0
20/2	10	0
10/2	5	0
5/2	2	1
2/2	1	0
1/2	0	1

Binary =  $[10100001]$  8 bits = (1 Byte)

B) convert to hex:decimal

161/16	10	1
10/16	0	10

hex:decimal =  $[0xa1]$

2) Convert Binary [1000010011001010] to decimal and hex:decimal

a) [1000010011001010]

$2^{15} \quad 2^{10} \quad 2^7 \quad 2^6 \quad 2^3 \quad 2^1$

$$32,768 + 1024 + 128 + 64 + 8 + 2 = \boxed{33,994}$$

B) [1000010011001010]

$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$   
8 4 c a

$\boxed{0x84ca}$  hex:decimal

3) Convert hex:decimal [0x7b4f] to decimal and Binary

a)

$$7 = 7 \cdot 16^3 = 28,672$$

$$b = 11 \cdot 16^2 = 2816$$

$$4 = 4 \cdot 16^1 = 64$$

$$f = 15 \cdot 16^0 = 15 +$$

$$\boxed{31,567}$$

B) Binary [0x7b4f]

$$7 = 0111$$

$$b = 1011$$

$$4 = 0100$$

$$f = 1111$$

$[0111 \quad 1011 \quad 0100 \quad 1111]$  (half word)

4) \_\_\_\_\_

(Signed integers)

Convert [132] to Binary and hex:decimal

a)

132/2	66	0
66/2	33	0
33/2	16	1
16/2	8	0
8/2	4	0
4/2	2	0
2/2	1	0
1/2	0	1

$[000000001000100]$  (halfword)

Sign extension

B) [132] to hex:decimal

132/16	8	4	$.25 \cdot 16 = 4$
8/16	0	8	

$\boxed{0x84}$  hex:decimal

5) Convert [-463] to Binary and hexadecimal

a) make it positive, divide by 2 then apply 2's complement

463/2	231	1
231/2	115	1
115/2	57	1
57/2	28	1
28/2	14	0
14/2	7	0
7/2	3	1
3/2	1	1
1/2	0	1

[0000000111001111]

B) hexadecimal

1111 1110 0011 0001  
f e 3 1

**0xfe31**

2's complement

111111000110000

$\xrightarrow{1+}$   
=> [111111000110001] (half word)

6) Convert Binary [01011001] into hexadecimal and decimal

a) 0101 = 5  
1001 = 9

**0x59**

B) [01011001] 2's complement  
 $2^6 + 2^4 + 2^3 + 2^0$

$64 + 16 + 8 + 1 = 89$

7) Convert Binary [10101101] into hex and decimal

a) 01010010

$\xrightarrow{1+}$   
**01010011** 1 byte

Binary to decimal

$2^6 + 2^4 + 2^1 + 2^0 = 83$

Complement = **-83**

B) 1010 1101

↓ ↓  
A D

**0xAD** hex

8) Convert hexadecimal [0x3c9a]

a)

[0011 1100 1001 1010] (half word)

B) 0x3c9a

$3 = 3 \cdot 16^3 = 12288$

$c = 12 \cdot 16^2 = 3072$

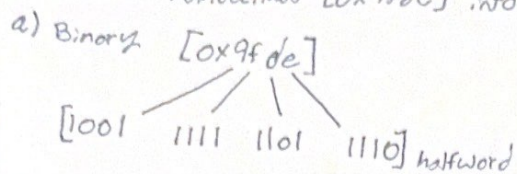
$9 = 9 \cdot 16^1 = 144$

$a = 10 \cdot 16^0 = 10$

**15514**



9) Convert hexadecimal [0x9fde] into decimal and Binary



B) decimal

invert bits

0110 0000 0010 0001

1+

0110 0000 0010 0010 conv to decimal

$$2^{14} + 2^{13} + 2^5 + 2^1 = 16384 + 8192 + 16 + 2$$

$$= 24594$$

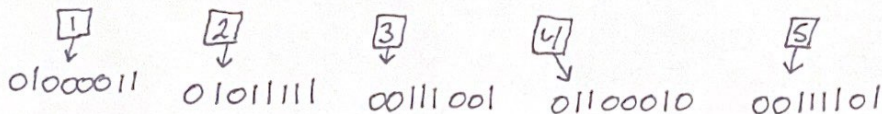
complement (odd neg)

-24594

Section 3

use ASCII table

10)



Binary to decimal:

1) 01000011

$$2^6 + 2^1 + 2^0$$

$$64 + 2 + 1 = \boxed{67}$$

2) 01011111

$$2^6 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$

$$64 + 16 + 8 + 4 + 2 + 1 = \boxed{95}$$

3) 00111001

$$2^5 + 2^4 + 2^3 + 2^0$$

$$32 + 16 + 8 + 1 = \boxed{57}$$

4) 01100010

$$2^6 + 2^5 + 2^1$$

$$64 + 32 + 2 = \boxed{98}$$

5) 00111101

$$2^5 + 2^4 + 2^3 + 2^2 + 2^0$$

$$32 + 16 + 8 + 4 + 1 = \boxed{61}$$

using ASCII table to convert decimal to characters.

$$67 = 'C'$$

$$95 = '_'$$

$$57 = '9'$$

$$98 = 'B'$$

$$61 = '='$$

converts to from left to right.

C\_9B=