HW2 陳樟博 110261035

Problem 1.

(a) 64=> 0100 0000, 64+64=>0100 0000+0100 0000=10000000

(Overflow in signed number)

(b)127=> 0111 1111 2’s complement=> -127 = 1000 0001

30= 0001 1110, -127+30 = 1001 1111 = -97 (Correct)

(c)In (b), -127 is known. -127-1= 1000 0001 - 0000 0001

= 1000 0000 =-128(Correct)

(d)38 = 0010 0110, 40 = 0010 1000 2’s complement =>

-40 = 1101 1000,

38+(-40) = 0010 0110+1101 1000=1111 1110 = -2 (Correct)

Problem 2.

(a)Using a byte(8bits), 20 = 0001 0100 => -20 = 1000 1100

In hexadecimal, 1110 1100 => 0xEC

(b)Using a byte(8bits), 114 = 0111 0010

In hexadecimal, 0111 0010 => 0x72

(c)Using a byte(8bits), -128 = 1000 0000

In hexadecimal, 1000 0000 => 0x80

(d)Using a half words(16bits),

129 = 0000 0000 1000 0001

=>-129 = 1111 1111 0111 1111

In hexadecimal, 0xff7f

Problem 3.

In 6 bits system, if the number is out of range -32~31 in signed number or 0 ~ 63 in unsigned number, Overflow Flag (OF) is set to be 1 and Carry Flag is set to be 1, respectively.

(a) -7+(-29) = -36 OF=1, CF=1

(b) 31+11 = 42 OF=1, CF=0

(c) 15-19 = -4 OF=0, CF=1

Problem 4.

1 byte = 8 bits, 1 word = 4bytes (32bits), 1 half word = 2byte(16bits)

Range:

1 byte => -128~127, 1 word => -2,147,483,648~2,147,483,647

1 half word => -32768~32767

(a)-32765 included in a half word and a word

(b)254 included in a half word and a word

(c)-1000000 included in word

(d)-128 included in a byte, a word and a half word

Problem 5.

1.-A+B(where B > A)

A’ +B=(2^n-1-A)+B=2^n+(B-A)-1

(The end-around carry which is equivalent to subtracting 2^n and adding 1)

2.-A-B(A+B<2^{n-1})

A’ +B’ =(2^n-1-A)+(2^n-1-B)=2^n+[2^n-1-(A+B)]-1

After end-around carry, the answer is correct(2^n-1-(A+B)=(A+B)’)