

# CISC 260 Machine Organization and Assembly Language (Spring 2019)

## Assignment # 1 (Due: February 28, 2019)

### Instruction for submission:

- Submit via Canvas
- For problem 4, your code should be in plain text file by itself.

1. [25 points] Convert the following numbers to other data representations. The binary is 8-bit, interpreted as two's complement.

Decimal	Hex	Binary
-35		
		1100 1100
73		
		0011 1010
	0xE7	

2. [25 points] ASCII code.
- Decode the following bit sequence (expressed in hexadecimal):  
X490341524D
  - Encode the following word to bit sequence (expressed in hexadecimal):  
CS=Fun
3. [20 points] With  $x = 0101\ 0101_{\text{two}}$  and  $y = 1100\ 0101_{\text{two}}$  representing two's complement signed integers, perform the following operations, showing all the work:
- $x + y$
  - $x - y$
- State decimal value of  $x$  and  $y$ , the expected answer, the actual answer, and if an overflow occurs.
4. [30 points] Write a C program to implement the Booth algorithm for multiplication of signed integers, as discussed in class. You may assume the input  $a$  and  $b$  are small enough, i.e., only require 16-bit, so that the product  $c = a \times b$  can fit into 32-bit. The following is a template for reading two integers  $a$  and  $b$ , and printing the product  $c = a \times b$ .

```
#include <stdio.h>

void main() {

    int a, b, c;
    printf("Enter an integer:\n");
    scanf("%d", &a);
    printf("Enter an integer:\n");
```

```

scanf("%d", &b);

c = 0; // product, initialized as 0.
// the code of your subroutine multBooth is called below
C = multBooth(a, b)

printf("the product = %d\n", c);

}

```

**Note:** multiplication operation is not allowed in your subroutine.

The flow chart of Booth algorithm is given here. For this assignment,  $n = 16$ .

