ECE 376 - Homework #2

Assembler, Flow Charts, Binary Inputs. Due Wednesday, September 6th
Please submit as a hard copy, submit on BlackBoard, or email

Assembler Programming

1) Determine the contents of registers W, A, and B after each assembler command:

Command	W	A	B
; Start	7	6	5
addlw 9			
addwf A,F			
sublw 3			
subwf B,W			
andwf A,F			
iorwf B,F			

2) Convert the following C code to assembler (8-bit operations)

```
unsigned char A, B, C;

A = B + 2*C + 3;
```

3) Convert the following C code to assembler: (16-bit operations)

```
unsigned int A, B, C;

A = B + 2*C + 3;
```

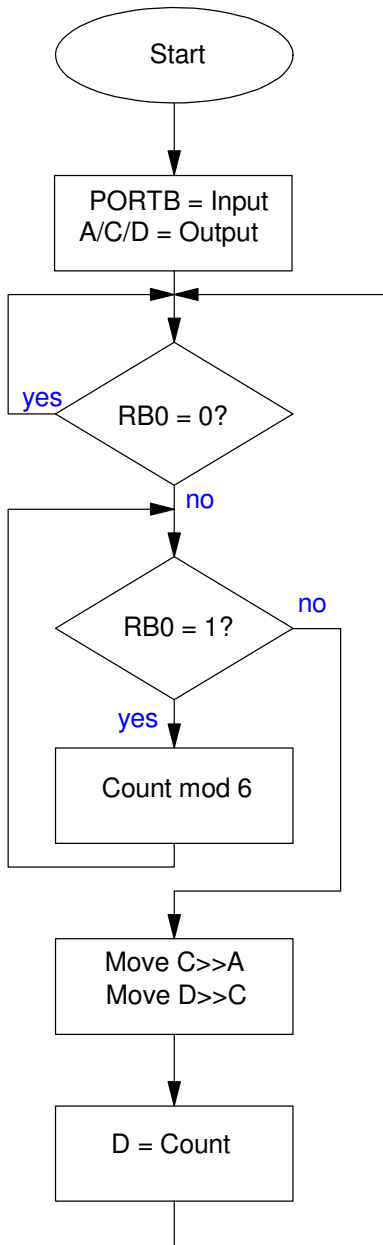4) Convert the following C code to assembler (if-statements)

```
unsigned char A, B;

A = A & 0x0F;
if(A == 0) B = 0;
if(A == 1) B = 1;
if(A == 2) B = 3;
if(A == 3) B = 7;
```

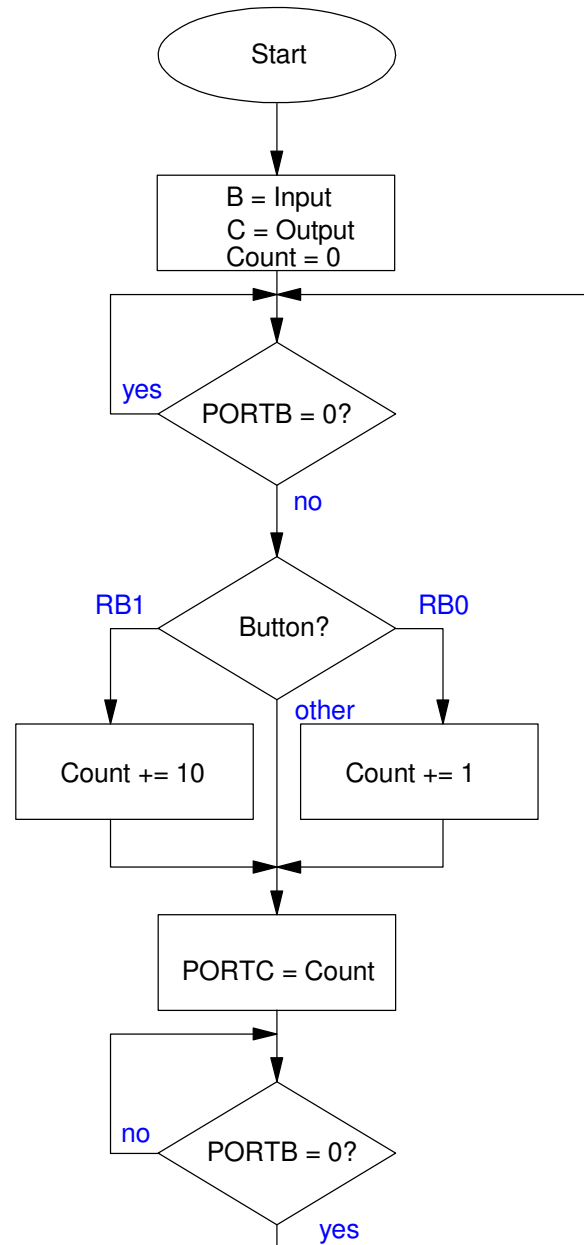5) The flow chart below rolls three six-sided dice, one at a time

- Press RB0 three times to roll the dice
- The values are displayed on PORTA, PORTC, and PORTD

Write the corresponding assembler code.

6) The flow chart below counts by one (RB0) or ten (RB1) each time you press the button. Write the corresponding assembly code

Problem 5

Start

PORTB = Input
A/C/D = Output

RB0 = 0?   yes

no

RB0 = 1?   no

yes

Count mod 6

Move C>>A
Move D>>C

D = Count

Problem 6

Start

B = Input
C = Output
Count = 0

PORTB = 0?   yes

no

Button?   RB1 / RB0 / other

Count += 10

Count += 1

PORTC = Count

PORTB = 0?   no / yes

Binary Inputs (hardware)

Assume a thermistor has a resistance-temperature relationship of

$$R = 1000 \cdot \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

7) Design a circuit which outputs
- 0V when T < 10C
- 5V when T > 10C

8) Design a circuit which outputs
- 0V when T < 10C
- 5V when T > 15C

9) Design a circuit which outputs
- 5V when 10C < T < 15C
- 0V otherwise