

# ECE 376 - Homework #2

Assembler, Binary Inputs, Counters

## Assembler Programming

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

| Command                 | W  | A  | B |
|-------------------------|----|----|---|
| <code>; Start</code>    | 13 | 11 | 9 |
| <code>addwf A, W</code> |    |    |   |
| <code>subwf B, W</code> |    |    |   |
| <code>movwf B</code>    |    |    |   |
| <code>movlw 17</code>   |    |    |   |
| <code>subwf A, F</code> |    |    |   |
| <code>negf B, F</code>  |    |    |   |

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

```
unsigned char A, B, C;
```

```
C = 4*A - 3*B + 7;
```

## Binary Inputs

A thermistor has the following temperature - resistance relationship:

$$R = 2000 \cdot \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

where T is the temperature in degrees C.

3) Design a circuit which outputs

- 0V when  $T < 10C$
- 5V when  $T > 10C$

4) Design a circuit which outputs

- 0V when  $T < 10C$
- 5V when  $T > 15C$
- No change for  $10C < T < 15C$

## Flow Charts & Counters

5) The flow chart below turns your PIC into a 6-sided die roll generator

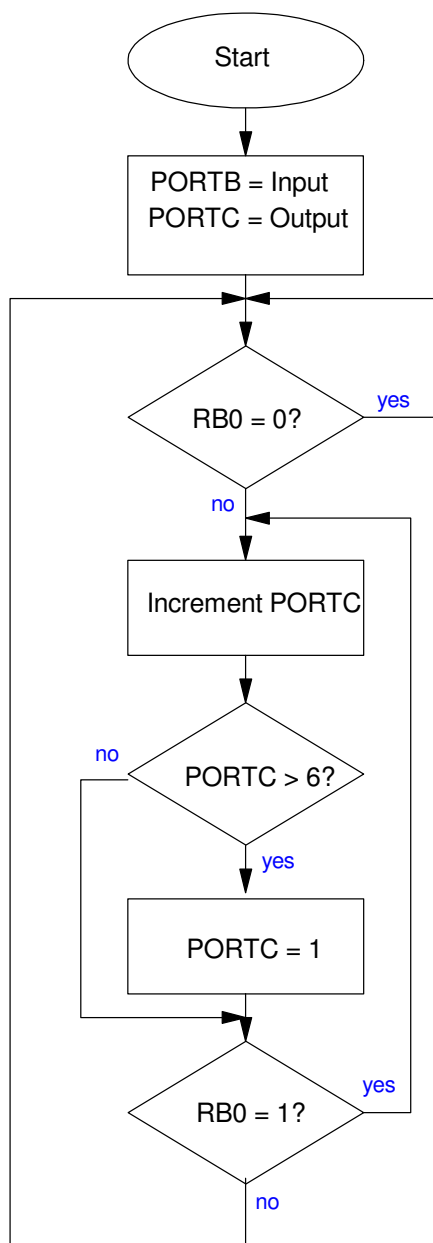
- When you press and release RB0, a random number in the range of (1..6) is displayed on PORTC

Write the corresponding assembler code.

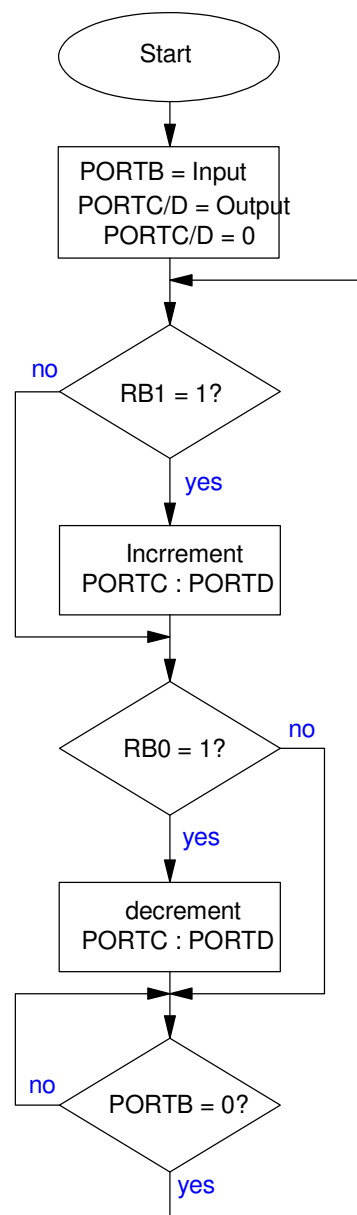
6) The flow chart below turns your PIC into a 16-bit up/down counter

- RB1: Count up by one every time RB1 is pressed and released
- RB0: Count down by one every time RB0 is pressed and released
- PORTC : PORTD display the count as a 16-bit number (0 - 65,535)

Write the corresponding assembler code



Problem 5: 6-Sided Die



Problem 6: Up/Down Counter