ECE 3724 Quiz #2 Solutions – Reese

Location	Contents:
0x047	0x98
0x048	0x3D
0x049	0x5A
0x04A	0xCB
....	
0x2A0	0x21
0x2A1	0x8E

Assume the W register has the value 0xA2 in it.

1. (2 pts) Give the machine code (in HEX) for the instruction: *incf 0x35A, w*

```
                  0010 10da ffff ffff
incf 0x35A,w      0010 1001 0101 1010
                   2    9    5   A
= 0x295A   (d = 0 because destination is w),
           (a = 1, because 0x35A is not in access bank, must use BSR)
note only the last 8 bits of 0x35A is encoded in the instruction.
```

2. (2 pts) The machine code 0x5C48 is what PIC18 instruction?

```
0x5C48 =   0101  1100 0100 1000
The first 6 bits (0101 11) indicates a SUBWF instruction.
 SUBWF =    0101  11da ffff ffff
 d = 0, so destination is W register (w)
 a = 0, so use the acess bank, ignore BSR (ACCESS)
 0x5C48 is  subwf 0x48,w, ACCESS
```

3. (2 pts) movlw 0x49

```
move the literal value 0x49 to W, so new value of W is 0x49.
```

4. (2 pts) subwf 0x047,f

```
0x047 = (0x047) - (w) = 0x98 - 0xA2 = 0xF6
new value of location 0x047 is 0xF6
```

5. (2 pts) A 20 MHz FOSC (PIC18 clock) has a period of 50 ns. How long does it take for the following instruction sequence to execute? Give the answer in MICROSECONDS.

```
movff   0x2A0, 0x2A1
incf    0x3A, f
subwf   0x5A, w
```

```
movff is 2 instr. cycles (8 clock cycles)
incf  is 1 inst.  cycle  (4 clock cycles)
subwf is 1 inst.  cycle  (4 clock cycles)

Total:   4 inst.  cycles = 16 clock cycles

16 * 50 ns = 800 ns = 0.8 us
```