16.317: Microprocessor Systems Design I

Fall 2013

Homework 6

Due **Monday, 11/25/13**

Notes:

- While typed solutions are preferred, handwritten solutions to these problems are acceptable.
- Any handwritten solutions that are scanned and submitted electronically must be clearly legible and combined into a single file—simply sending a picture of each scanned page is not an acceptable form of submission.
- This assignment is worth a total of 50 points.

1. *(30 points)* Show the result of each PIC 16F684 instruction in the sequences below. Be sure to show not only the state of updated registers, but also the carry (C) and zero (Z) bits.

a.
```
cblock 0x20
    x
endc

movlw   0x05
sublw   0x15
clrf    x
comf    x, F
xorwf   x, F
swapf   x, W
btfsc   x, 7
bsf     x, 0
```

b.
```
cblock  0x20
    A
    B
endc

clrf    A
movlw   0x11
movwf   B
addlw   0x34
subwf   A, F
comf    A, W
swapf   A, F
```

c.
```
cblock 0x40
    var1
endc

movlw   0x1E
movwf   var1
rrf     var1, F
xorwf   var1, W
btfss   var1, 4
iorlw   0x06
andwf   var1, F
bcf     var1, 0
```

2. *(20 points)* For each of the following 80386 instructions, write a sequence of PIC 16F684 instructions that performs an equivalent operation.

   Assume that variables are defined for all 8-bit 80386 registers so that you can use the same register names (for example, part (a) should use variables “AL” and “BL”).

   Also, note that shift or rotate operations should not be done by simply writing copies of the PIC rotate instructions—for example, the solution to part (c) shouldn’t just be 5 copies of the “rlf” instruction. Use the shift amount provided as a literal value that will help determine the number of times you shift or rotate.

a. MOV AL, BL

b. SHL AL, 4

c. RCL AL, 5

d. ROR AL, 2

e. JNC Label