

16.317: Microprocessor Systems Design I

Spring 2014

Homework 5

Due **Wednesday, 4/16/14**

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