ECE3210 Microprocessor Engineering

Homework 3

1. Assume that the registers have the following values (all in hex) and that CS = 1000, DS =2000, SS = 3000, SI = 4000, DI = 5000, BX = 6080, BP = 7000, AX = 25FF, CX =8791, and DX =1299.

Calculate the physical address of the memory where the operand is stored and the contents of the memory locations, assuming real model operation

   (a) MOV [SI], AL

   location 24000 (20000 + 4000) contains FF

   (b) MOV [BX+SI+8], AH

   location 2A088 (20000 + 6080 +4000 + 8) contains 25

   (c) MOV [BX], AX
   location 26080 (20000 + 6080) contains FF
   location 26081 contains 25

   (d) MOV [BP+SI+10], DX
   location 3B010 (30000 +7000+ 4000 + 10) contains 99
   location 3B011 contains 12

   (e) MOV [3600], AX
   location 23600 (20000 + 3600) contains FF
   location 23601 contains 25

2. Assume that SP = FF2EH, AX = 3291H, BX = F43CH, and CX =09H. Find the contents of the stack and SP after the execution of the following three instructions.

PUSH AX

PUSH BX

PUSH CX

logical address   stack contents
SS:FF2C   91
SS:FF2D   32

after "PUSH BX", the stack pointer = FF2A and the stack is as follows:
logical address   stack contents
SS:FF2A   3C

SS:FF2B   F4
SS:FF2C   91
SS:FF2D   32

after "PUSH CX", the stack pointer = FF28 and the stack is as follows:

logical address   stack contents
SS:FF28   09
SS:FF29   00
SS:FF2A   3C
SS:FF2B   F4
SS:FF2C   91
SS:FF2D   32

3. Find the errors in the following program, and provide reasons for the errors.

```
        .MODEL      SMALL
        .STACK 100
        .DATA
           X   DB    ?
           Y   DW    ?
           Z   DW    ?
        .CODE
            .STARTUP

        MAIN PROC FAR
           MOV DS, SS    ;  SEGMENT REGISTER
           MOV [DI], [BX] ; MEMEORY TO MEMORY
            MOV AX, 12H
            MOV BX, AL    ; MIXED SIZE
            MOV Y, AX
            MOV Z, Y      ; MEMORY TO MEMORY
            MOV X, 345H  ; SIZE NOT MATCHING
            LEA BX, X
            MOV [BX]   AL ; SHOULD BE MOV [BX], AL
             .Exit

        MAIN ENDP
        END
```

4. Assuem that x and y are two memory variables of word-size allocated at the offset address of 1000h and 1002h, respectively. What are the final contents of the registers ax, bx and cx?

code segment

```
        mov x, 1234h
        mov y, 5678h
        mov bx, 1000h
        mov ax, bx
        mov cx, [bx]
        mov bl, byte y
    code ends
```

AX __1000H_____   BX ___1078H_____   CX____1234H_____

4. 3.32(b)

11000H +0250H+0500H+0200H = 11950H

5. Chapter 3.35(c)

(c) 07100H

6. Chapter 3.45

(a) short (b) near (c) short (d) far

Short: 8-bit displacement, +127 to -128 bytes

Near: 16-bit displacement, +/- 32K bytes

----------------End----------------