**HW # 4:  Theme: Debugging, Flags, Data Declarations**

*All main questions carry equal weight.*

*(Credit will be awarded to only those answers for which work has been shown.)*

Note: For Problems 1 to 6, you must NOT program on computer. Only handwritten answers are required. For Problem 7, you must code the program inside the Visual Studio/MASM environment and submit a screenshot showing the output of you running your code. You must also provide your code in the Word/PDF file you are submitting. The above-mentioned screenshots should also be embedded in the same file.

1. A. Write a program fragment that will clear the sign flag

.code

mov ax, 0

sub ax, 1

add ax, 4 ; SF= 0

      B. Write a program fragment that will clear the carry flag.

.code

Mov al, 0

Sub al, 1 ; CF = 1

Add al 1, ; CF = 0

      C. Write a program fragment that clear the overflow flag.

.code

Mov al, +127

Add al, 1 ;OF = 1

Add al, 1 ; OF = 0

      D. What will be the value of the parity flag after the following lines execute?  Show your work.

                         mov al, 17 ; 00010001 ; PF = 1  
                      add al, 10 ; 00011011; PF = 0

1. Given the following data declarations:

.data  
 MyArray  BYTE 4Eh, 64h, 9Ah, 7Fh, 3Ch  
 Total    WORD ?  
  
.code

Write instructions that sum the elements of the array into AX and then save the resultant sum in the location Total.

.code

Mov ax, 0

Mov esi, offset MyArray

Mov ecx, 5

NEXT: Add ax, [esi]

Add esi, 2

LOOP NEXT ;

Mov [Total], ax

1. (Little Endian) Fill in the requested register values after executions of the instructions:

     Show the memory map using an address-data table.

.data  
myBytes      BYTE   21h, 67h, 8Ch, 0BAh  
myWords      WORD   45A8h, 49A3h, 0AC32h, 257Bh, 0DF30h  
myDoubles    DWORD  0E1D4h, 0C273h, 67F2h, 0B34Ch, 9679h  
myPointer    DWORD  myDoubles  
  
.code  
 mov esi, OFFSET myBytes                              
 mov ax, WORD PTR [esi+1] ;           AX = 6721h             
 mov eax, DWORD PTR myWords  ;           EAX

=49A345A8h             
 mov esi, myPointer  
 mov ax, WORD PTR [esi+2]              ;       AX = 00E1h  
 mov ax, WORD PTR [esi+3]             ;       AX = 0000h               
 mov ax, WORD PTR [esi-2]              ;     AX = 3025h

Memory map:

1. EAX = 00006721h

2. EAX = 49A345A8h

3. EAX = 49A300E1h

4. EAX = 49A30000h

5. EAX = 49A33025h

1. What is the value of ax after each of the following instructions?

.data  
myArray DWORD 2 DUP (9), 2130, 65, 0CDEh, 6 DUP (2)  
  
.code  
 mov ax, TYPE myarray ; AX = 4  
 mov ax, sizeof myarray ; AX = 4 \* 11 = 44  
 mov ax, lengthof myarray ; AX = 2 + 1 +1 +1 + 6 = 11

1. (Sign Extension) Fill in the requested register values after executions of the instructions:

.code  
 mov bx, 0B62Eh                                
 movzx eax, bx                   ; EAX = 0000B62Eh  
 movzx edx, bh                   ; EDX = 000000B6  
 movzx cx, bl                    ; CX =  002E   
  
 mov bx, 0C142h  
 movsx eax, bx                   ; EAX = FFFFC142  
 movsx edx, bl                   ; EDX = FFFFFF42  
 movsx cx, bh                    ; CX = FFC1

1. (Indirect, Little Endian) What will be the value of the destination operand after each of the following instructions execute?

.data  
var1 BYTE   7, 6, 0Fh, 3  
var2 WORD    2122h, 9396h, 0F10Dh, 9527h  
var3 SWORD   -55, -25  
var4 DWORD   21B3h, 40C2h, 4CAFh, 5D79h  
  
.code  
 mov ax, [var1+1]                        ;  AX  =0607  
 mov ax, [var2+2]                             ;  AX = 9621  
 mov ax, var3 ; AX = C995h  
 mov ax, [var3-2] ; AX = 27F1h

7. Write a program that prints your <FirstName Lastname> on your screen. You can use the template provided. Assemble and generate the output using MASM and Visual Studio. Embed your output in your submission.

