Assembly Language, 3rd year	Suez Canal University
Final Exam	Faculty of Computers and Informatics
Time: 2 Hours.	Computer Science department
5th Jan. 2014	Instructor: Dr. Ahmed Sallam

This exam in both sides, make sure to answer all the questions. "No Calculators allowed"

1. (10 Points) **True (T) or False (F)?, and <u>Correct the wrong sentences</u>:**

a. Memory access take more machine cycles than registers. [ ]
b. The more a program relies on paging, the slower it runs. [ ]
c. In assembly language, reserved words can be used as identifiers [ ]
d. "push bh" is a valid instruction in MASM. [ ]
e. In assembly language, string constants must be enclosed in double quotes. [ ]
f. The "inc", and "dec" instructions have no effect over the overflow flag. [ ]
g. The EIP register cannot be the destination operand of a MOV instruction. [ ]
h. The CPU cannot distinguish between signed and unsigned integers [ ]
i. The SIZEOF operator counts the number of elements in a single data declaration.
j. Local variables in procedures are created on the stack. [ ]

2. (10 Points) **Complete the following sentences:**

a. The ………… contains the address of the next instruction and known as the program counter.
b. As soon as the program begins running, it is called a …………
c. I/O is available at different access levels including High level languages functions, …………, and …………
d. In assembly language, the maximum length of an identifier name is …………
e. Labels in the code area of a program (where instructions are located) must end with ………… character.
f. The ………… directive has the same purpose as the NOP instruction.
g. The ………… instruction has no effect over the flags.
h. The ………… operator returns the address of a variable.
i. The ………… instruction returns from a procedure.
j. ………… pushes the 32-bit general-purpose registers on the stack

(10 Points) **Use the following data for the next questions:**

```
.data
myBytes   BYTE    30h,70h,0A0h,40h,60h
myWords  WORD  3 DUP(?),4000h
myString  BYTE    "hello!!"
```

a. Write a single instruction that moves the first two bytes in myBytes to the DX register.
b. Write an instruction that moves the second byte in myWords to the AL register.
c. Write an instruction that moves the first four bytes in myBytes to the EAX register.
d. Insert a LABEL directive in the given data that permits myWords to be moved directly to a 32-bit register.
e. What will be the value of EAX after executing the instruction "mov eax, LENGTHOF myWords"
f. Consider AX=07ffh, write down the values of the Carry, Sign, Zero, and Overflow flags after each instruction has executed: (*Instructions are separated, not dependent on each other*)

```
f.1.  add al,1h        ;  CF =   SF =    ZF =    OF =
f.2.  inc al           ;  CF =   SF =    ZF =    OF =
f.3.  sub ah,08        ;  CF =   SF =    ZF =    OF =
f.4.  neg ax           ;  CF =   SF =    ZF =    OF =
```

4. (10 Points) **Trace the following Assembly program then answer the questions:**

```
1.   INCLUDE Irvine32.inc
2.
3.   .data
4.   wordVal     label word
5.   byteVal     byte 01h,02h
6.               byte 03h,04h
7.   dwordVal    dword 05060708h
8.   pntr        dword dwordVal
9.
10.  .code
11.  main PROC
12.         pushfd
13.
14.         mov esi, type dwordVal
15.         inc byteVal[esi]
16.
17.         mov ax, wordVal
18.         mov bh, byteVal+4
19.         mov bl, sizeof  byteVal
20.         mov edi, pntr
21.         mov dx, word ptr [edi+2]
22.
23.         sub byteVal, 02
24.
25.         popfd
26.         call dumpregs
27.         exit
28.  main ENDP
29   END main
```

a. What is the value of the registers AX, BX, DX, and ESI after executing this program.

b. What is the value of the flags CF, SF, OF after executing this program

c. What is the value of BL if we change line 19 into "mov bl, lengthof byteVal"

d. What is the value of DX if we change line 21 into "mov dx, word ptr [dwordVal+2]".

e. Write the contents of memory in bytes for ".data" section after executing the program.
Hint: this question asks about the proper bytes order for the stored variables in memory

6. (5 points) **Using Irvine32.lib, write a complete assembly language program to find the maximum number in a given List of integers such that List={3,7,1,2,15,9,4,11}. The output should look as following:**

```
The Maximum number is 15
```

7. (5 points) **A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself (e.g. 2, 3, 5, 7,…). Using Irvine32.lib, write a complete Assembly language program contains a procedure to check whether a given number is prime or not. The program should prompt the user for an integer number and print "Prime" or " Not Prime".**

Do your best, and Good Luck …