Name: KEY **Id#**

COE 205, Term 092

Computer Organization & Assembly Programming

Quiz# 4

Date: Monday, April 26, 2010

Q1.

(i) Write a procedure, **SwapRows,** that receives the address of an array of integers (i.e. Dword), two row numbers to be exchanged, the number of elements in a row and swaps the content of the two rows in the array. Assume that all parameters will be passed on the stack and that the procedure will preserve the content of all registers. Note that to multiply two operands you can use the imul instruction e.g. eax=eax*4 is implemented as imul eax, 4 while eax=eax*ebx is implemented as imul eax, ebx.

(ii)

```
SwapRows Proc

    PUSH EBP
    MOV EBP, ESP
    ; save registers
    PUSH EAX
    PUSH EBX
    PUSH ECX
    PUSH EDX
    PUSH ESI
    PUSH EDI
    ; get arguments from teh stack
    MOV EBX, [EBP+8]  ; address of the array
    MOV ESI, [EBP+12] ; first row to be echanged
    MOV EDI, [EBP+16] ; second row to be exchanged
    MOV ECX, [EBP+20] ; number of elements in a row
    MOV EDX, ECX
    ; compute first row starting address
    IMUL EDX, 4
    IMUL ESI, EDX
    ADD ESI, EBX
    ; compute second row starting address
    IMUL EDI, EDX
    ADD EDI, EBX
    XOR EDX, EDX
    ; swap the two rows
Next:
```

```
        MOV EAX, [ESI+EDX*4]
        XCHG EAX, [EDI+EDX*4]
        MOV [ESI+EDX*4], EAX
        INC EDX
        LOOP Next
        ; restores registers
        POP EDI
        POP ESI
        POP EDX
        POP ECX
        POP EBX
        POP EAX

        RET 16
SwapRows Endp
```

(iii) Use the procedure **SwapRows** to swap row 0 and row 3 of the following array:

```
Array Dword     1, 2, 3, 4
      Dword     5, 6, 7, 8
      Dword     9, 10, 11, 12
      Dword     13, 14, 15, 16
```

```
push 4
push 0
push 2
push offset Array
Call SwapRows
```