Computer Science Department
California State University, Fullerton

CPSC 240 Computer Organization and Assembly Language
Quiz 03
8:00 PM to 9:15 AM
Thursday, November 10, 2022

Student Name: _____

Last 4 digits of ID: _____

Note:

- University regulations on academic honesty will be strictly enforced.
- You have 75 minutes to complete this Quiz.
- Close books, slides, and turn off the computer.
- Turn off or turn vibration your cell phone.
- Any content submitted after the due date will be regarded as a make-up quiz.

1. What would be in the **ax, bx,** and **dx** registers after execution? What would be in **num1, num2,** and **num3** memories before and after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

```
section .data
num1  dw    7
num2  dw    3
num3  dw    0

section .text
      global   _start
_start:
      mov   ax, word[num1]
      mov   bx, word[num2]
      mul   bx
      mov   word[num3], ax
```

(30 points)

Memory	Offset	Value (Hex)	
		before(initial)	after
num3	+1	00h	00h
num3	+0	00h	15h (21)
num2	+1	00h	00h
num2	+0	03h	03h
num1	+1	00h	00h
num1	+0	07h	07h

Register	Value (Hex)
	after execution
ax	0015h
bx	0003h
dx	0000h

2. What would be in the **ah, al, bl,** and **cl** registers after execution. What would be in the **mul3** memory before and after execution? Show answer in hex, full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

```
section .data
mul3    db      0

section .text
        global _start
_start:
        mov     cl, 3
next:
        mov     ah, 0
        mov     al, cl
        mov     bl, 3
        div     bl
        cmp     ah, 0
        jne     skip                    ;if(ah != 0) goto skip
        inc     byte[mul3]
skip:
        inc     cl
        cmp     cl, 7
        jne     next                    ;if(cl != 7) goto next
```

(12 points)

Memory	Offset	Value (Hex)	
		before(initial)	after
mul3	+0	00h	02h

Register	Value (Hex)
	After execution
ah	00h
al	02h
bl	03h
cl	07h

3. What would be in the **al** and **rsi** registers after execution. What would be in the **num** and **sum** memory before and after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

```
section .data
num     db      9, 5, 3, 6, 8
sum     db      0

section .text
        global _start
_start:
        mov     al, 0
        mov     rsi, 0
next:
        add     al, byte[num+rsi]
        inc     rsi
        cmp     rsi, 5
        jne     next                ;if(rsi != 5) goto next
        mov     byte[sum], al
```

(28 points)

Memory	Offset	Value (decimal)	
		before (initial)	after
sum	+0	0	31
num	+4	8	8
num	+3	6	6
num	+2	3	3
num	+1	5	5
num	+0	9	9

Register	Value (Hex)
	After execution
al	1fh (31)
rsi	00000000 00000005h

4. What would be in the **rax, rdi, rsi,** and **rdx** registers after execution? What would be in the **str1** and **str2** memory and **Terminal Window** after execution? Show register answer in full register size. *Note*, pay close attention to the register sizes (8-bit, 16-bit, 32-bit, or 64-bit).

```
%macro print  2
       mov    rax, 1
       mov    rdi, 1
       mov    rsi, %1
       mov    rdx, %2
       syscall
%endmacro

section .data
str1   db     "abc", 10
str2   db     "123"

section .text
       global _start
_start:
       print  str1, 4
       print  str2, 3
```

(22 points)

Memory	Offset	Value (character)	
		before (initial)	after
str2	+2	'3'	'3'
str2	+1	'2'	'2'
str2	+0	'1'	'1'
str1	+4	10	10
str1	+2	'c'	'c'
str1	+1	'b'	'b'
str1	+0	'a'	'a'

Register	Value (Hex)
	After execution
rax	00000000 00000001h(3)
rdi	00000000 00000001h
rsi	&str2
rdx	00000000 00000003h

Terminal window: (6 points)

```
abc
123
```