

Part 1 – Short Answers [3 points]

1. What will be the value of EAX after each of the following instructions execute?

mov eax, TYPE myString	;a. 00000001h
mov eax, SIZEOF myBytes	;b. 00000005h
mov eax, LENGTHOF myBytes	;c. 00000005h
mov eax, LENGTHOF myWords	;d. 00000007h
mov eax, SIZEOF myWords	;e. 0000000Eh
mov eax, SIZEOF myString	;f. 0000000Dh
mov eax, SIZEOF myDWords	;g. 0000000Ch
mov eax, LENGTHOF myDWords	;h. 00000003h

2. Write a single instruction that moves the last two bytes in myBytes to the CX register. What will be the resulting value of CX?

```
mov cx, WORD PTR [myBytes+3]
```

3. Write an instruction that moves the fourth byte in myWords to AL register.

```
mov al, BYTE PTR [myWords+3]
```

Part2 – Programming Tasks [10 points]

4. Fibonacci Numbers – With the use of a loop, write an assembly program that calculates the first nine values of the Fibonacci number sequence and put the result in eax register. The Fibonacci number sequence is described by the formula:

$\text{Fib}(1) = 1, \text{Fib}(2)=1, \text{Fib}(n) = \text{Fib}(n-1) + \text{Fib}(n-2)$

You will get this sequence for the first nine values: 1, 1, 2, 3, 5, 8, 13, 21, 34

The result in eax needs to be 34.

```

.data
    current DWORD 1h
    previous DWORD 0h

.code

main PROC
    mov eax, 0h
    mov ebx, 0h
    mov ecx, 8h

L1:
    mov eax, current
    mov ebx, previous
    mov previous, eax
    add eax, ebx
    mov current, eax
    loop L1

    invoke ExitProcess,0
main ENDP
end main

```

5. Copy a String in Reverse Order – With the use of a loop and indexed addressing, write an assembly program that copies a string from source to target in a reverse order. Use the following variables:

source BYTE "CS397 Assembly Language Programming", 0
target BYTE SIZEOF source DUP('?')

```

.data
    source BYTE "CS397 Assembly Language Programming",0
    target BYTE SIZEOF source DUP('?')

.code

main PROC
    mov esi,0
    mov edi,LENGTHOF source - 1
    mov ecx,SIZEOF source

L1:

```

```
mov eax, 0
mov al,source[esi]
mov target[edi],al
inc esi
dec edi
loop L1
```

```
INVOKE ExitProcess,0
```

Part 3 – Runtime Stack [7 points]

Using Microsoft Visual Studio, execute the codes below and answer questions 6-8.

.code

SumOfFirstNTerms PROC

; Sum of the first N terms of the arithmetic series,

; for example, if N = 5, then the result is 5+4+3+2+1=15

; Receives: EAX as N

; Returns: EAX = sum of the first N terms

; Requires: N needs to be a positive integer

```
    mov ecx, eax
```

```
    mov eax, 0
```

L1:

```
    add eax, ecx
```

```
    loop L1
```

```
    ret ; line7
```

SumOfFirstNTerms ENDP

main PROC

```
    mov eax, 'ABab'
```

```
    push eax ; line1
```

```
    push 00000061h ; line2
```

```
    push 00000041h ; line3
```

```
    push 5 ; line4
```

```
    pop eax ; line5
```

```
    call SumOfFirstNTerms ; line6
```

```
    pop eax
```

main ENDP

end main

6. Show the screenshot of the stack in the memory (like the ones shown below) after the

codes are executed.

```
Memory 1
Address: 0x0019FF2D
0x0019FF2D 00 00 00 00 00 00 00 00 00 00 00 00 30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FFFA 00 00 00 00 00 00 00 00 00 00 00 00 30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF67 00 00 00 00 00 00 00 00 00 00 00 00 30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF84 54 86 bc 76 00 e0 3e 00 30 86 bc 76 29 74 ac fe dc ff 19 00 17 4b aa 77 00 e0 3e 00 3d T..v.à>0.vét-püý...K&w.à>=
0x0019FFA1 59 01 3b 00 00 00 00 00 00 00 00 00 e0 3e 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 Y.;.....à>.....
0x0019FFBE 00 00 3d 59 01 3b a0 ff 19 00 00 00 30 00 e4 ff 19 00 f0 6a ab 77 b1 5d ab 4c 00 00 00 ..e.y.j ý.....äy.ðjmw]«L...
0x0019FFDB 00 ec ff 19 00 e7 4a aa 77 ff ff ff ff 6e 9f ac 77 00 00 00 00 00 00 00 05 10 40 00 .iy.cj&wyyyyN~w.....@.
0x0019FFF8 00 e0 3e 00 00 00 00 00 41 63 74 78 20 00 00 01 00 00 00 00 18 33 00 dc 00 00 00 ..à>.....Actx .....3..Ü...
0x001A0015 00 00 00 20 00 00 00 00 00 00 00 00 14 30 00 00 01 00 00 07 00 00 34 00 00 7c 01 .. .....4...|.
0x001A0032 00 00 01 00 00 00 00 00 00 00 00 00 30 00 00 00 00 00 00 00 00 00 00 00 00 02 00 00 .....
0x001A004F 00 4e ef 26 1a 98 02 00 00 44 00 00 30 e0 02 00 5c 02 00 00 00 00 ba 71 32 f3 .NI&^...D...â...\.....sq26
0x001A006C 3c 05 00 00 4a 00 00 00 88 05 00 00 42 03 00 00 00 00 5b 49 59 2d cc 08 00 00 32 <...J...^...B...[IV-i...2
0x001A0089 00 00 00 00 09 00 00 fa 02 00 00 30 00 cd ea ce 32 fc 0b 00 00 42 00 00 00 40 0c ...ú.....féi2ü...B...@.
0x001A00A6 00 00 30 03 00 00 00 00 c8 5f 30 38 70 0f 00 00 5e 00 d0 0f 00 00 62 03 00 ..0...È p8p...^...D...b...
0x001A00C3 00 00 00 00 44 05 28 b1 34 13 00 30 56 00 00 8c 13 00 92 03 00 00 10 00 00 ..0...(±4...V...E...G...
0x001A00E0 09 00 00 00 ec 00 00 00 02 00 00 31 00 00 7c 01 00 00 dc 15 00 00 01 00 00 02 ....ì.....|...Ü...
0x001A00FD 00 00 00 58 17 00 00 a0 07 00 01 30 00 00 03 00 00 f8 1e 00 00 8c 0e 00 00 01 00 ...X... ..ø...E...
```

```
Memory 1
Address: 0x0019FF2D
Columns: Auto
0x0019FF2D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF4A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF67 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 61 00 00 00 62 61 42 41 .....a...baBA
0x0019FF84 54 86 bc 76 0e e0 3e 00 30 86 bc 76 e9 74 ac fe dc ff 19 00 17 4b aa 77 00 e0 00 3e 00 3d T..v.à>0.vét-pÿü...K=w.â>. =
0x0019FFA1 59 01 3b 00 00 00 00 00 00 00 e0 3e 00 00 00 00 e4 ff 19 00 f0 6a ab 77 b1 5d ab 4c 00 00 00 Y.;.....>.....
0x0019FFBE 00 00 3d 59 01 3b aa ff 19 00 00 00 00 00 e4 ff 19 00 f0 6a ab 77 b1 5d ab 4c 00 00 00 =Y.; y.....äy.õj«w1|«L...
0x0019FFDB 00 ec ff 19 00 e7 4a aa 77 ff ff ff ff 6e 9f ac 77 00 00 00 00 00 00 00 00 00 05 10 40 00 .iy.çj>wÿÿÿÿÿV-w.....@.
0x0019FFF8 00 e0 3e 00 00 00 00 00 41 63 74 78 20 00 00 00 01 00 00 18 33 00 dc 00 00 00 00 00 00 à>.....Actx.....3..Ü....
0x001AA0015 00 00 00 20 00 00 00 00 00 00 00 14 00 00 00 01 00 00 00 07 00 00 00 34 00 00 00 7c 01 ..>.....Actx.....4...|.
0x001AA0032 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 00 00 00 00 ..0.....
0x001AA004F 00 4e ef 26 1a 98 02 00 00 44 00 00 e0 02 00 5c 02 00 00 00 00 00 ba 71 32 f3 ...N&?...D.....ä...\.....q26
0x001AA006C 3c 05 00 00 4a 00 00 00 88 05 00 00 42 03 00 00 00 00 00 5b 49 59 2d cc 08 00 00 32 <...J...^...B.....[IV-i...2
0x001AA0089 00 00 00 00 09 00 00 fa 02 00 00 00 00 00 cd ea ce 32 fc 0b 00 00 42 00 00 00 40 c0 00 ü.....ú.....fiêïzù...B...@.
0x001AA00A6 00 00 30 03 00 00 00 00 00 c8 5f 50 38 70 0f 00 00 5e 00 00 d0 0f 00 00 62 03 00 ..0.....ÈP8p...^...D...b...
0x001AA00C3 00 00 00 00 00 44 05 28 b1 34 13 00 00 56 00 00 8c 13 00 00 92 03 00 00 10 00 00 00 ..0.....D.(±4...V...E.....
0x001AA00E0 09 00 00 00 ec 00 00 00 02 00 00 00 01 00 00 7c 01 00 dc 15 00 00 01 00 00 00 02 ...i.i.....|.....Ü.....
0x001AA00FD 00 00 00 58 17 00 00 a0 07 00 00 01 00 00 00 03 00 00 f8 1e 00 00 8c 0e 00 00 01 00 ...X.....ø...Æ.....
```

```
Memory 1
Address: 0x0019FF2D
0x0019FF2D  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF4A  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FF67  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 41 00 00 61 00 00 62 61 42 41 .....
0x0019FF84  54 86 bc 76 00 e0 3e 00 30 86 bc 76 e9 74 ac fe dc ff 19 00 17 4b aa 77 00 e0 3e 00 3d .....
0x0019FFA1  59 01 3b 00 00 00 00 00 00 00 00 00 e0 3e 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x0019FFBE  00 0c 3d 59 01 3b a0 ff 19 00 00 00 00 00 e4 ff 19 00 f0 6a ab 77 b1 5d ab 4c 00 00 00 .....
0x0019FFDB  00 ec ff 19 00 e7 4a aa 7f ff ff ff ff 6e 9f ac 77 00 00 00 00 00 00 00 00 00 05 10 40 00 .....
0x0019FFF8  00 e0 3e 00 00 00 00 00 00 00 00 00 41 63 74 78 20 00 00 00 01 00 00 18 33 00 dc 00 00 00 .....
0x001A0015  00 00 20 00 00 00 00 00 00 00 00 00 00 14 00 00 00 01 00 00 07 00 00 34 00 00 7c 01 .....
0x001A0032  00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0x001A004F  00 4e ef 26 1a 98 02 00 00 44 00 00 e0 02 00 00 5c 02 00 00 00 00 00 ba 71 32 f3 .....
0x001A006C  3c 05 00 00 4a 00 00 00 88 05 00 00 42 03 00 00 00 00 00 5b 49 59 2d cc 08 00 00 32 .....
0x001A0089  00 00 00 00 09 00 fa 02 00 00 00 00 00 cd ea ce 32 fc 0b 00 00 42 00 00 00 40 0c .....
0x001A00A6  00 00 30 03 00 00 00 00 c8 5f 50 38 70 0f 00 00 5e 00 00 00 d0 0f 00 00 62 03 00 .....
0x001A00C3  00 00 00 00 44 05 28 b1 34 13 00 00 56 00 00 8c 13 00 00 92 03 00 00 10 00 00 00 .....
0x001A00E0  09 00 00 00 ec 00 00 02 00 00 01 00 00 7c 01 00 dc 15 00 00 01 00 00 01 00 00 02 .....
0x001A00FD  00 00 00 58 17 00 a0 07 00 00 01 00 00 03 00 00 f8 1e 00 00 8c 0e 00 00 01 00 00 .....

```


