EASTERN MEDITERRANEAN UNIVERSITY

Faculty of Engineering
Department of Computer Engineering

CMPE 323: Microprocessors

Quiz 1

Date: 17 / 10 / 2018

Lecturer: Prof.Dr. Hasan Kömürcügil **Time Allowed:** 60 minutes

Name and Surname: SOLUTION

Student Number: .....

- There are **4** questions in this exam paper.
- Answer **all** questions.
- Write **clearly** and **tidily.**
- Correct answers **without sufficient explanation** might not get full points!
- Mobile phones **must be switched off** in the exam room.

Question	Points Gained
Q1 *(34 points)*	
Q2 *(20 points)*	
Q3 *(30 points)*	
Q4 *(16 points)*	
Total	

Q1) [34 *points*]

Assume that DATA 1 starts at address 06H. Show the offset addresses (in hexadecimal) and the memory contents (in hexadecimal). You may use the ASCII codes shown below if needed.

```
            .Data
DATA1       DB    00110111B
DATA2       DD    27, 35E48ACH
            ORG   2EH
DATA3       DB    'Quiz 1'
DATA4       DW    4FH
DATA5       DB    2 DUP(74H)
```

Memory Offset Add. (in Hex)	Memory Contents (in Hex)
06	37
07	1B
08	00
09	00
0A	00
0B	AC
0C	48
0D	5E
0E	03

2E	51
2F	75
30	69
31	7A
32	20
33	31
34	4F
35	00
36	74
37	74

Ctrl	Dec	Hex	Ch	Code
^@	0	00		NUL
^A	1	01	☺	SOH
^B	2	02	☻	STX
^C	3	03	♥	ETX
^D	4	04	♦	EOT
^E	5	05	♣	ENQ
^F	6	06	♠	ACK
^G	7	07	•	BEL
^H	8	08	◘	BS
^I	9	09	○	HT
^J	10	0A	◙	LF
^K	11	0B	♂	VT
^L	12	0C	♀	FF
^M	13	0D	♪	CR
^N	14	0E	♫	SO
^O	15	0F	☼	SI
^P	16	10	►	DLE
^Q	17	11	◄	DC1
^R	18	12	↕	DC2
^S	19	13	‼	DC3
^T	20	14	¶	DC4
^U	21	15	§	NAK
^V	22	16	▬	SYN
^W	23	17	↨	ETB
^X	24	18	↑	CAN
^Y	25	19	↓	EM
^Z	26	1A	→	SUB
^[	27	1B	←	ESC
^\	28	1C	∟	FS
^]	29	1D	↔	GS
^^	30	1E	▲	RS
^_	31	1F	▼	US

Dec	Hex	Ch
32	20	
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?

Dec	Hex	Ch
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

Dec	Hex	Ch
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	⌂

Q2) [20 *points*]

Answer the following questions.

a) [10 pts] If SS=5CE1H and SP=46A8H, calculate the <u>physical address</u> (PA) of the stack segment and the <u>highest address</u> available in the stack segment.

PA = SS x 16 + SP = 5CE10 + 46A8 = 614B8H

Highest address of SS = 5CE10 + FFFF = 6CE0FH

b) [10 pts] Consider the following instructions

```
MOV AX, 0FFFEH
ADD AX, 2H
INC AH
```

AH= 01 (in H)

AL= 00 (in H)

CF= 0 (in B)

ZF= 0 (inB)

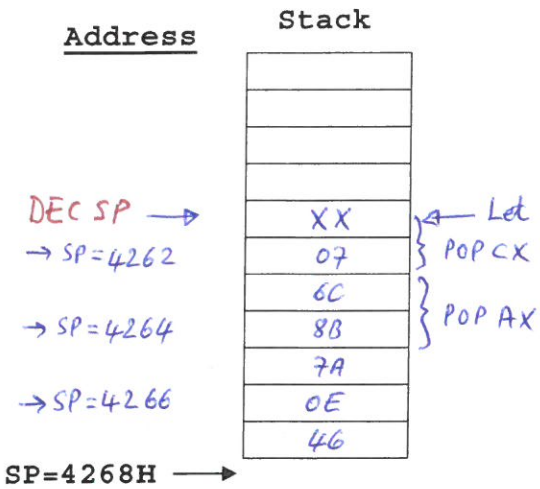
Find the contents of AH, AL, carry flag (CF) and zero flag (ZF).

Q3) [30 *points*]

Trace the following program segment and find the contents of Stack, AX, CX and DX. Note that the stack grows from higher addresses to lower addresses.

```
        .DATA
DATA1 DW 460EH, 7A8BH
        .CODE
        MOV BX, Offset DATA1
        MOV CX, [BX]
        MOV DX, 6C07H
        MOV AX, [BX+2]
        PUSH CX
        PUSH AX
        PUSH DX
        DEC SP
        POP CX
        POP AX
```

CX = 460E
DX = 6C07
AX = 7A8B



AX=8B6C (in H) CX=07XX (in H) DX=6C07 (in H)

Q4) [16 *points*]

Trace the following program segment and find the contents of AL, BH, CX and ZF.

```
                ……
                MOV CX, 2
                MOV AL, 38H
                MOV BH, 3AH
Again:          CMP BH, AL
                JA Next
                JMP Exit
Next:           DEC BH
                LOOP Again
Exit:           ……
```

	CX	AL	BH	ZF
	0002	38	3A	0
	0011		39	0
	0000		38	1

AL=38 (in H) BH=38 (in H) CX=0000 (in H) ZF=1 (in B)