EASTERN MEDITERRANEAN UNIVERSITY

Faculty of Engineering
Department of Computer Engineering

CMPE 323: Microprocessors

Quiz # 1

Lecturer: Prof.Dr. Hasan Kömürcügil

Date: 23 / 10 / 2017
Time Allowed: 50 minutes

Name and Surname: SOLUTIONS

Student Number: .....

- There are **3** questions in this quiz 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 *(44 points)*	
Q2 *(16 points)*	
Q3 *(40 points)*	
Total	

Q1) [44 *points*]

Consider the following data segment:

```
            .Data
            ORG  20
DATA1       DB   'Hello Micro!'
DATA2       DB   01011001B
DATA3       DD   378EF05H
            ORG  40H
DATA4       DW   16, 0D794H
```

Show the offset addresses (in hexadecimal) and the memory contents (in hexadecimal). You may use the ASCII codes shown below if needed.

Ctrl	Dec	Hex	Ch	Code	Dec	Hex	Ch	Dec	Hex	Ch	Dec	Hex	Ch
^@	0	00		NUL	32	20		64	40	@	96	60	`
^A	1	01	☺	SOH	33	21	!	65	41	A	97	61	a
^B	2	02	☻	STX	34	22	"	66	42	B	98	62	b
^C	3	03	♥	ETX	35	23	#	67	43	C	99	63	c
^D	4	04	♦	EOT	36	24	$	68	44	D	100	64	d
^E	5	05	♣	ENQ	37	25	%	69	45	E	101	65	e
^F	6	06	♠	ACK	38	26	&	70	46	F	102	66	f
^G	7	07	•	BEL	39	27	'	71	47	G	103	67	g
^H	8	08	◘	BS	40	28	(	72	48	H	104	68	h
^I	9	09	○	HT	41	29	)	73	49	I	105	69	i
^J	10	0A	◙	LF	42	2A	*	74	4A	J	106	6A	j
^K	11	0B	♂	VT	43	2B	+	75	4B	K	107	6B	k
^L	12	0C	♀	FF	44	2C	,	76	4C	L	108	6C	l
^M	13	0D	♪	CR	45	2D	-	77	4D	M	109	6D	m
^N	14	0E	♫	SO	46	2E	.	78	4E	N	110	6E	n
^O	15	0F	☼	SI	47	2F	/	79	4F	O	111	6F	o
^P	16	10	►	DLE	48	30	0	80	50	P	112	70	p
^Q	17	11	◄	DC1	49	31	1	81	51	Q	113	71	q
^R	18	12	↕	DC2	50	32	2	82	52	R	114	72	r
^S	19	13	‼	DC3	51	33	3	83	53	S	115	73	s
^T	20	14	¶	DC4	52	34	4	84	54	T	116	74	t
^U	21	15	§	NAK	53	35	5	85	55	U	117	75	u
^V	22	16	▬	SYN	54	36	6	86	56	V	118	76	v
^W	23	17	↨	ETB	55	37	7	87	57	W	119	77	w
^X	24	18	↑	CAN	56	38	8	88	58	X	120	78	x
^Y	25	19	↓	EM	57	39	9	89	59	Y	121	79	y
^Z	26	1A	→	SUB	58	3A	:	90	5A	Z	122	7A	z
^[	27	1B	←	ESC	59	3B	;	91	5B	[	123	7B	{
^\	28	1C	∟	FS	60	3C	<	92	5C	\	124	7C	|
^]	29	1D	↔	GS	61	3D	=	93	5D	]	125	7D	}
^^	30	1E	▲	RS	62	3E	>	94	5E	^	126	7E	~
^_	31	1F	▼	US	63	3F	?	95	5F	_	127	7F	⌂

Memory Offset Add. (in Hex)	Memory Contents (in Hex)
14	48
15	65
16	6C
17	6C
18	6F
19	20
1A	4D
1B	69
1C	63
1D	72
1E	6F
1F	21
20	59
21	05
22	EF
23	78
24	03
40	10
41	00
42	94
43	D7

Q2) [16 *points*]

Answer the following questions.

a) If SS=7FA2H and SP=438EH, calculate the physical address (PA) of the stack segment and the highest address available in the stack segment.

PA = 7FA20H + 438EH = 83DAEH

Highest address of SS = 7FA20H + FFFFH = 8FA1FH

b) Consider the following instructions

```
MOV AX, 359BH
ADD AX, 2718H
MOV [1500], AX
```

[1500]= B3 (in H)

[1501]= 5C (in H)

Assuming that Little Endian convention is used, find the contents of memory locations 1500 and 1501.

```
  359B
+ 2718
------
AX= 5CB3
```

Q3) [40 *points*]

Trace the following program segment and find the contents of Stack, AX, CX and DL.

```
        .DATA
DATA1 DB 25H, 97H
        .CODE
        MOV BX, Offset DATA1
        MOV AL, [BX]
        CBW
        PUSH AX
        INC BX
        MOV DL, [BX]
        MOV AL, DL
        CBW
        MOV CX, AX
        PUSH CX
        INC CX
        POP AX
        POP CX
```

AX: 0025

AX =

DL = 97

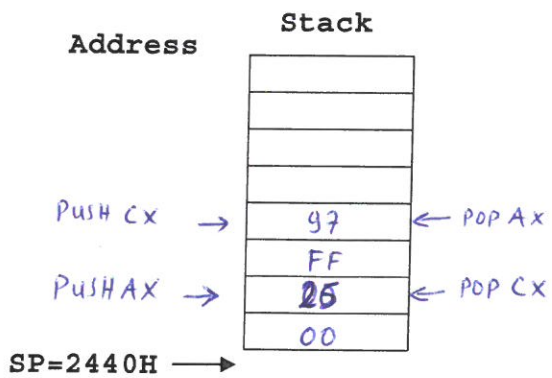
AX = FF97

CX = FF97

CX = FF98

AX = FF97

CX = 0025



AX= FF97 (in H) **CX=** 0025 (in H) **DL=** 97 (in H)