EE213 Computer Organization and Assembly Language
Quiz III (GR2) Solution – Spring 2018
April 30, 2018
Paper: A

1. Elaborate the following directive: **(4 Points)**

```
.model COMPACT, STD, NEARSTACK
```

The directive creates one code segment and multiple data segments where stack segment is present within one of the data segments. Standard calling convention is used to clean up the stack

2. Encode the given instructions, provide hex-decimal values only **(8 Points)**:

MOD=11		
R/M	W = 0	W = 1
000	AL	AX
001	CL	CX
010	DL	DX
011	BL	BX
100	AH	SP
101	CH	BP
110	DH	SI
111	BH	DI

Instruction	Opcode
MOV	1000 10dw
ADD	0000 00dw
SUB	0010 10dw
OR	0000 10dw
XOR	0011 00dw
AND	0010 01dw
PUSH (16 bits)	50h
POP(16 bits)	58h

`SUB AL, BL`

0010 1000 11 011 000

= 28 D8 h

`XOR AX, 10h`

33 + 00←10 00

= 33 10 00 h

`SUB AL, 03h`

0010 1010 + 00

2A + 00 ← 03

= 2A03 h

`PUSH 21 h`

50 ← 21 00

= 50 2100 h

3. Elaborate through an example, how does **SCASW** differ from **CMPSW?** (4 Points)

Answer: **SCASW** instruction compares a value in *AX* to a word addressed by *EDI* whereas **CMPSW** compares a WORD operand pointed to by ESI to a WORD operand pointed to by EDI.
e.g. **FREE RESPONSE**

4. Using string primitive instructions, replace each element of given array by its mathematical square, assume any valid type for array1. (4 Points)

array1 =

11	12	13	14	15	16	17	18	19	20

Solution:

```
.data
    array BYTE 11,12,13,14,15,16,17,18,19,20
.code
    main PROC
    cld
    mov esi,OFFSET array
    mov edi,esi
    mov ecx,LENGTHOF array
    L1: lodsb                   ; load [ESI] into AL
    mul AL                      ; AL²
    stosb                       ; store AL into [EDI]
    loop L1
```