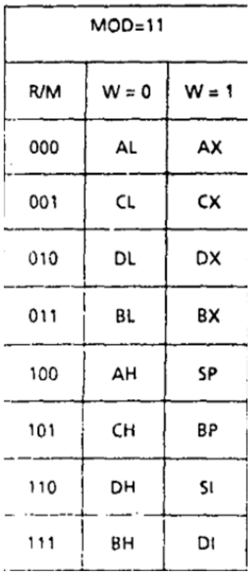
EE213 Computer Organization and Assembly Language
Quiz III (GR1) Solution – Spring 2018
April 30, 2018
Paper: B

1. 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

`MOV AH, AL`

1000 1000 11 000 100

= 88 C4 h

`PUSH SI`

50 h + 6h

=56 h

`ADD AL, 0BAh`

0000 0010 + 000

02 + 00 ←BA

=02 BA h

`POP SP`

58h + 4h

=5C h

2. Elaborate the following directive: (4 Points)
.model MEDIUM, C, FARSTACK

Answer: The directive creates multiple code segments and a single data segment where stack segment is maintained outside the data segment. C calling convention is used to clean up the stack

3. Elaborate through an example, how does `CMPSB` differ from `SCASB`? (4 Points)

Answer: **SCASB** instruction compares a value in *AL* to a word addressed by *EDI* whereas **CMPSB** compares a BYTE operand pointed to by ESI to a BYTE 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                       ; AL^2
     stosb                        ; store AL into [EDI]
     loop L1
```