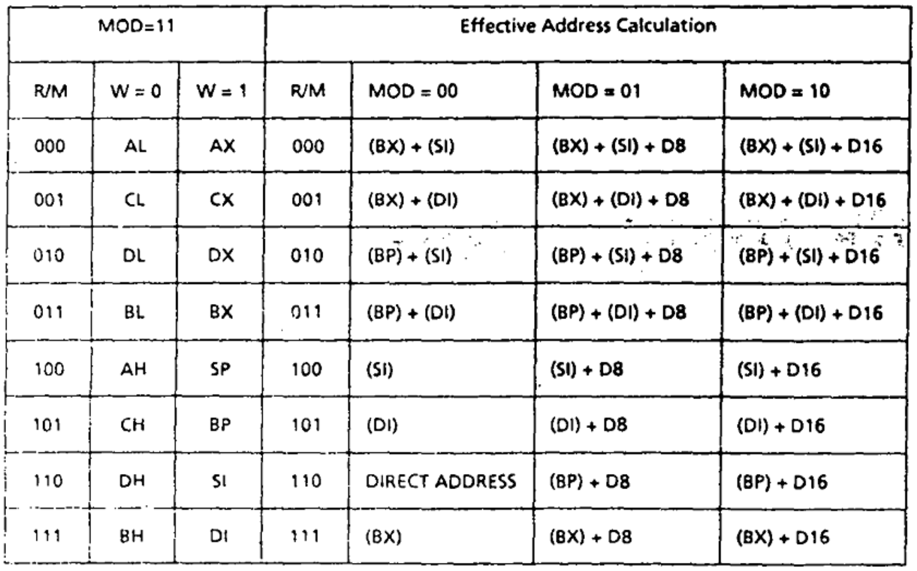
EE213 Computer Organization and Assembly Language
Quiz III– FALL 2018
December 07th, 2018
Section: D
Paper-B

Student Name: ______________________________ Roll#______________________________



MOD=11			Effective Address Calculation			
R/M	W = 0	W = 1	R/M	MOD = 00	MOD = 01	MOD = 10
000	AL	AX	000	(BX) + (SI)	(BX) + (SI) + D8	(BX) + (SI) + D16
001	CL	CX	001	(BX) + (DI)	(BX) + (DI) + D8	(BX) + (DI) + D16
010	DL	DX	010	(BP) + (SI)	(BP) + (SI) + D8	(BP) + (SI) + D16
011	BL	BX	011	(BP) + (DI)	(BP) + (DI) + D8	(BP) + (DI) + D16
100	AH	SP	100	(SI)	(SI) + D8	(SI) + D16
101	CH	BP	101	(DI)	(DI) + D8	(DI) + D16
110	DH	SI	110	DIRECT ADDRESS	(BP) + D8	(BP) + D16
111	BH	DI	111	(BX)	(BX) + D8	(BX) + D16

ADD	0000 00DW
ADD reg/mem,imm	1000 000W (Ext 000)
MOV	1000 100DW
MOV reg/mem,imm	1100 011W (Ext 000)
MUL	1111 011W (Ext 100)
SUB	0010 10DW
SUB reg/mem,imm	1000 100W (Ext 101)
POP reg16	0101 1000
POP mem16	1000 1111 (Ext 000)
PUSH reg16	0101 0000
PUSH imm	0110 1000
PUSH mem16	1111 1111 (Ext 110)

1. **Provide machine language (in hex-decimal) for the following x86 instructions** **[14 Points]**

   a. `MUL WORD PTR [BX+DI+08h]`

   1111 0111 01 100 001 ←08
   F7 61 08h

   b. `MOV DX, 1F1Eh`

   1100 0111 + 010 ←1E 1F
   C7 + 2 ←1E 1F
   C9 1E 1Fh

   c. `ADD [BX+DI+1709h], 0F0E1h`

   1000 0001 10 000 001 ← 09 17 ← E1 F0
   81 81 09 17 E1 F0h

   d. `SUB DX,CX`

   0010 1001 11 001 010
   29 CAh

   e. `MUL CH`

   1111 0110 + 101
   F6 + 5
   FBh

   f. `SUB [DI], BX`

   0010 1001 00 011 101
   29 1Dh

   g. `PUSH 170h`

   0110 1000 ← 70 01
   68 70 01h

2. Give one reason for a CPU to have an interrupt mechanism **[2 Points]**

   FREE RESPONSE QUESTION

3. Calculate the average of fourth and fifth column of the following 2D array in EDX **[4 Points]**

45	32	33	3	19	45
01	12	76	12	23	43
20	100	18	81	98	33

```
Rowlength = 6
col_length = 3
col_index = 3
num_of_cols = 2
.CODE
MAIN PROC
MOV   ebx,OFFSET array
ADD   ebx,(TYPE array*col_index)
MOV   ecx, col_length -1
MOV   eax,[ebx]

L1:
ADD   eax,[ebx+TYPE ARRAY]
ADD   ebx, Rowlength*TYPE array
ADD   eax,[ebx]
LOOP L1
ADD   eax,[ebx+TYPE ARRAY]

MOV   DX,0
MOV   CX,Col_length*num_of_cols
DIV   CX
MOVZX EDX,AX
```

4. Write a procedure that should calculate and replace each of the following elements with their square roots without using LOOP, make use of **string primitive instructions**. **[4 Points]**

SQUARES WORD 4,9,16,25,36,49,64,81,100

Solution:

```
P1 PROC
      MOV   EDI, OFFSET squares
      MOV   BX,2
      MOV   ECX, LENGTHOF squares
      L1:
      MOV   DX,0
      LODSW
      DIV   BX
      CBW
      STOSW
      INC   BX
      DEC   ECX
      CMP   ECX,0
      JA    L1
      Ret
P1 ENDP
```