EE213 Computer Organization and Assembly Language
Quiz I _Section A_Fall 2019
September 18, 2019
Paper-A Solution

1. Assuming the following data segment starts at **1F1D 0100h**, answer the following questions: **[08 Points]**

```
.data
      val16       LABEL       WORD
      var1        SBYTE       19h,90h
      var2        WORD        0F1C1h, 2 DUP (0ABCDh, 0ABFFh)
      var3        DWORD       $
.code
      MOV         EAX, PTR DWORD [val16+4]          ;EAX = AB FF AB CDh
      MOV         EBX, OFFSET [var2+2]              ;EBX = 1F 1D 01 04h
      ADD         WORD PTR [EBX], 2                 ;[1F1D0104] = CD+2 = CF
      MOV         EDX, EAX                          ;EDX = AB FF AB CDh
      XCHG        DH, DL                            ;EDX = AB FF CD ABh
      SUB         EBX, 4                            ;EBX = 1F 1D 01 00h
      XCHG        AX, WORD PTR [EBX]                ;[EBX]=ABCD EAX=AB FF 90 19
```

VAL16/VAR1	**1F1D 0100**	19		**1F1D 0108**	CD
	1F1D 0101	90		**1F1D 0109**	AB
VAR2	**1F1D 0102**	C1		**1F1D 010A**	FF
	1F1D 0103	F1		**1F1D 010B**	AB
	1F1D 0104	CD	**VAR3**	**1F1D 010C**	0C
	1F1D 0105	AB		**1F1D 010D**	01
	1F1D 0106	FF		**1F1D 010E**	1D
	1F1D 0107	AB		**1F1D 010F**	1F

A. What does **EAX**, and **EDX** contain after the above code gets executed?

EAX = **AB FF 90 19h**
EDX = **AB FF CD ABh**

B. Draw out whole the **data segment** (byte by byte) after above code gets executed. **[06 Points]**

VAL64/VAR1	**1F1D 0100**	**CD**		**1F1D 0108**	CD
	1F1D 0101	**AB**		**1F1D 0109**	AB
VAR2	**1F1D 0102**	C1		**1F1D 010A**	FF
	1F1D 0103	F1		**1F1D 010B**	AB
	1F1D 0104	**CF**	**VAR3**	**1F1D 010C**	0C
	1F1D 0105	AB		**1F1D 010D**	01
	1F1D 0106	FF		**1F1D 010E**	1D
	1F1D 0107	AB		**1F1D 010F**	1F

2. Briefly elaborate the purpose of each of the following components with example. **[04 Points]**

1. TYPE operator **2.** Overflow Flag (OF) **3.** OFFSET Operator **4.** EDS Register

- The **TYPE** operator returns the size, in bytes, of a single element of a data declaration.
  E.g.

```
.data
      var1 BYTE ?
      var2 WORD ?
```

Expression	Value
TYPE var1	1
TYPE var2	2

- The **Overflow** flag (OF) is set when the result of a *signed* arithmetic operation is too large or too small to fit into the destination.
  E.g.

```
MOV   Al,-128
SUB   Al,1          ;OF = 1
```

- The **OFFSET** operator returns the offset of a variable/data label.
- The **EDS (Extended Data Segment)** register contain the data segment numbers (base address).