CSE341: Microprocessors
Assignment 1

1. Describe the purpose and operation of the segment registers in the 8086 architecture. How are they different from general-purpose registers?

2. A system using an 8086 microprocessor has a program loaded into memory at segment address A4FB. If an instruction references an offset 4872h. What is the physical address?

3. How many segments of 64KB can be allocated in the 1MB memory space of the 8086?

4. Deduce the 5th largest and 5th smallest possible segment numbers and logical addresses for 32556h.

5. Let's say the size of the data bus is 16 bit and the address bus is 32 bit. Calculate:
   i) The maximum size of memory that is supported
   ii) Let's say we insert a memory of 3GB. Explain in brief, is the memory accessible fully.
   iii) Let's say we insert a memory of 6GB. Explain in brief, is the memory accessible fully.

6. Suppose two hexadecimal numbers (i) FFCD and (ii) FFXY are to be added by an Intel 8086 microprocessor. Find
   i)

         Given PF = 0 & AF = 1 , Maximum value for XY
         Given PF = 0 & AF = 0 , Maximum value for XY
         Given PF = 1 & AF = 0 , Maximum value for XY
         Given PF = 1 & AF = 1 , Maximum value for XY

   ii)
         Find the minimum value for XY for same values of PF and AF given in i)

7. Find the values of the status flag registers for each set of instructions
   i)
   MOV AX, 7E40h
   MOV BX, 3BC0h
   ADD AX, BX

   ii)
   MOV AX, FFh
   MOV BX, 01h
   ADD AX, BX

8. A portion of a memory is given below, where there are memory locations and their corresponding **instruction bytes** or **data**.

Address	07000h	07001h	27000h	27001h	37000h	37001h
Data	12h	34h	56h	78h	10h	20h

a. Assume for an Intel 8086, CS = 2000h, DS = 3000h, SS = 2000h, BX = 1000h, BP = 2000h, IP = 3456h, and SI = 3000h. Now if MOV DX, [BP + SI + 2000h] is the next instruction that is to be fetched. Deduce from which memory location will the 8086 start fetching the above-given instruction.

b. Deduce using mathematical calculations, what data will be stored in DX after the execution of the above given instruction.

9. Identify which addressing modes are they:

i) MOV AX, [1234H] ii) MOV CL, [BX] iii) MOV AL, [SI+4H] iv) MOV [BP+DI+08H], DL v) JMP 0040H	vi) PUSH AX vii) POP BX viii) PUSH [SI] ix) POP [DI] x) CALL FUNC xi) IN AL, 60H xii) OUT 64H, AL xiii) IN AX, DX xv) OUT DX, AX	xvi) CLC xvii) STI xviii) NOP xix) RET xx) CMC

10. i) MOV AX, [BX + 5634h] - convert this assembly instruction to Machine Code. Also show the hex representation of the machine code.

   ii) 89879140h convert this into an assembly instruction.