EECE.3170: Microprocessor Systems Design I
Summer 2016

Homework 2
Due **1:00 PM, Monday, 5/23/16**

Notes:
- While typed solutions are preferred, handwritten solutions are acceptable.
- Any electronic submission must be in a single file. Archive files will not be accepted.
- Electronic submissions should be e-mailed to Dr. Geiger at Michael_Geiger@uml.edu. Please include your name as part of your filename (for example, mgeiger_hw2.pdf).
- This assignment is worth 100 points.

1. (50 points) Assume the state of an x86 processor's registers and memory are:

EAX: EECE3170h
EBX: 00000001h
ECX: 00000002h
EDX: 00000004h
ESI: 00020100h
EDI: 00020110h

Address	Lo			Hi
20100h	10	00	08	00
20104h	10	10	FF	FF
20108h	08	00	19	91
2010Ch	20	40	60	80
20110h	02	00	AB	0F
20114h	30	99	11	55
20118h	40	AA	7C	EE
2011Ch	FF	BB	42	D2
20120h	30	CC	30	90

What is the result of each of the instructions listed below? Assume that the instructions execute in sequence—in other words, the result of each instruction may depend on the results of earlier instructions. Correctly evaluating each instruction will earn you **5 points**.

Note that you may assume any constant values shown using less than 32 bits are zero-extended to 32 bits if necessary (for example, 000Fh = 0000000Fh).

```
MOV     DL, FEh
MOV     DH, AL
MOVSX   BX, BYTE PTR [ESI+000Fh]
MOV     [EDI+ECX], EBX
MOV     [ESI+4*ECX], AX

XCHG    CL, [ESI]

MOVZX   EAX, WORD PTR [EDI+ECX]

MOV     DX, [EDI+FFFFFFFAh]

LEA     ECX, [ESI+EBX+0017h]

MOVSX   EBX, BYTE PTR [ESI+4]
```

2. Assume the initial state of an x86 processor's registers, memory, and carry flag are:

EAX: 00003170h
EBX: 9876DCBAh
ECX: 00001995h
EDX: AC921E14h
ESI: 00008440h
CF: 0

Address	Lo			Hi
8440h	FF	03	99	87
8444h	08	09	F6	BB
8448h	78	15	00	00

What is the result of each of the instructions listed below? Assume that the instructions execute in sequence—in other words, the result of each instruction may depend on the results of earlier instructions. Correctly evaluating each instruction will earn you **5 points**.

Note that you may assume any constant values shown using less than 32 bits are zero-extended to 32 bits if necessary (for example, 000Fh = 0000000Fh).

    ADD   AX, BX
    ADC   EAX, ECX
    INC   WORD PTR [ESI]
    MUL   BYTE PTR [ESI+4]
    SUB   AX, [ESI+8]
    DEC   AH
    IMUL   AH
    IDIV   DL
    DIV   DH
    NEG   AH