

16.317: Microprocessor Systems Design I

Fall 2013

Homework 3

Due **Monday, 9/30/13**—**NO LATE SUBMISSIONS**

Notes:

- While typed solutions are preferred, handwritten solutions to these problems are acceptable.
- Any handwritten solutions that are scanned and submitted electronically must be clearly legible and combined into a single file—simply sending a picture of each scanned page is not an acceptable form of submission.
- Remember, the solution for this assignment will be posted early on 10/1 to allow you to view it before the exam, so **no late submissions will be allowed.**
- This assignment is worth a total of 50 points.

1. (30 points) Assume the state of an x86 processor's registers and memory are:

EAX: 00000010H
EBX: 00000020H
ECX: 00000030H
EDX: 00000040H
CF: 1
ESI: 00000100H
EDI: 00000100H
DS: 2000H

Address

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	00	11	55
20118H	40	00	7C	EE
2011CH	FF	00	42	D2
20120H	30	00	30	90

What is the result produced in the destination operand by each of the instructions listed below? Assume that the instructions execute in sequence (in other words, the result of the first instruction affects the operation of the second instruction, and so on).

ADD AX, 00FFH
ADC SI, AX
INC BYTE PTR [0100H]
SUB DL, BL
SBB DL, [0114H]
DEC BYTE PTR [DI+BX]
NEG BYTE PTR [DI+0018H]
MUL DX
IMUL BYTE PTR [SI+FEF7H]
DIV BYTE PTR [SI+FEF9H]
IDIV BYTE PTR[SI+FF01H]

2. (20 points) Assume the state of the 80386DX's registers and memory are:

EAX: 00005555H	Address
EBX: 00000010H	45100H
ECX: 00000010H	0F F0 00 FF
EDX: 0000AAAAH	...
ESI: 000000F2H	45200H
EDI: 00000200H	30 00 19 91
DS: 4500H	...
	45210H
	AA AA AB 0F
	...
	45220H
	55 55 7C EE
	...
	45300H
	AA 55 30 90

What is the result produced in the destination operand by each of the instructions listed below? Assume that the instructions execute in sequence.

AND BYTE PTR [0300H], 0FH
SAR DX, 8
OR [BX+DI], AX
SHL AX, 2
XOR AX, [SI+BX]
NOT BYTE PTR [0300H]
SHR AX, 4