EE467/567 "Advanced Microprocessors"

Assignment #1

(Due: Friday January 20th in-class)

Show all work, not just the answers!!

1. What are the values of the <u>double word</u> stored in memory starting at address $A0007_{16}$ and $A0008_{16}$ in a memory connected to an Intel Architecture CPU? The contents of memory locations $A0006_{16}$, $A0007_{16}$, $A0008_{16}$, $A0009_{16}$, $A000A_{16}$, $A000B_{16}$, $A000C_{16}$, $A000D_{16}$, $A000E_{16}$, $A000F_{16}$ are C2, 88, 02, CB, AA, 96, 32, A3, 4B, 70, respectively. Is this an example of an aligned double word or a misaligned double word?

2. Calculate the value of each of the physical addresses that follows given that the machine operates in Real Mode. Assume all numbers are hexadecimal numbers:
   (a) 2402:1234
   (b) 0100:AABC
   (c) A220:12DE
   (d) B3D5:F40D

3. Find the unknown value for each of the following physical addresses. Assume all numbers are hexadecimal numbers.
   (a) B100:? = B2144
   (b) ?:232C = 4A42C
   (c) C456:? = CABC0
   (d) ?:CD21 = 41D21

4. Identify the addressing modes used for the source and the destination operands in the instructions that follow:

   a) MOV   AL, [BP][SI] + 012AH
   b) MOV   CL, 25H
   c) AND   CL, [1400]
   d) IMUL CL
   e) MOV   CL, [BP][DI]*8 + 1200H
   f) MOV   DL, CL
   g) MOV   DL,[SI] + 2844H
   h) MOV   [BX+SI] + 88H, DX

5. Compute the effective and physical addresses (assume real-mode) for the specified operand in each of the following instructions. The register contents and variables are as follows:
   (CS) = $0A00_{16}$, (DS) = $0B00_{16}$, (SI) = 0100_{16}, (DI) = 0200_{16}, and (BX) = 0300_{16}.

   a)   Destination operand of the instruction: MOV [DI], AX
   b)   Source operand of the instruction: MOV DI, [SI]
   c)   Destination operand of the instruction: MOV [BX]+0400H, CX

d)   Destination operand of the instruction: MOV [DI]+0400H, AH
e)   Destination operand of the instruction: MOV [BX][DI]+0400H, AL

6.   Convert the following lines of assembly code to machine code using the Intel
        Developer's Manual (Volumes 2a and 2b).

a)   MOV   EAX, EBX
b)   ADD   ECX, 8
c)   SUB   DX, [BP][SI] + 01ABH
d)   XOR   EAX, [EBX][EDI]

7.   Textbook (8th edition) chapter 3 problem 7

8.   Textbook (8th edition) chapter 3 problem 23

Graduate Students ONLY:
9.   Suppose the first two bytes of an instruction are 89 B7. What are the possible
        instructions associated with this combination?

10.   Convert the following lines of assembly code to machine code using the Intel
        Developer's Manual (Volumes 2a and 2b):

a)   XOR EAX, [ECX+8*ESI]+1234H
b)   PUSH [1246H]
c)   INC [BP]+68H