Engineering 4862   MICROPROCESSORS

Assignment 1

Instructor: Cheng Li   Due: May 19, 2005

Covers in Textbook: Chapter 0, Chapter 1, Chapter 2 (part),
Unless otherwise noted, please show all relevant calculations, and explain your answers where appropriate.

0. What is pipelining? Is it possible to have more than two units working in parallel in a microprocessor? If yes, give an example of such a microprocessor. If no, explain why not.

1. Convert the following to binary, decimal, and hexadecimal:
a. 50_{10}
b. 101111011_2
c. 512_{10}
d. $E29_{16}$
e. 123_{10}
f. $1FFF_{16}$

2. Perform Addition and Subtraction for the following HEX numbers
a. 24FH-129H
b. F94H+5C6H
c. FFFFH+1111H
d. 2FFFFH-FFFFFH
e. EF9H-5BCH
f. 5FC54H-3DFE5H

3. Convert -32_{10} and 71_{16} to binary, and add the numbers together. Can the original and final numbers be stored in 8-bit registers?

4. Explain how the 8086/8088 uses 16-bit segment registers to access memory in a 1MB address space.

5. Calculate the physical addresses from the following logical addresses and give the lower and upper range of that segment:
a. 100EH:34D2H
b. EF01H:0001H
c. 010AH:2EDBH

6. Calculate 3 different logical addresses from the physical address 4E276H.

7. Suppose that for a certain device to operate, it requires 2MB of RAM and 6MB of ROM. What is the minimum number of address lines the microprocessor must support? Draw a memory map of the system; assume that the addresses for the RAM are below the addresses for the ROM.

8. In a given byte-addressable computer, memory locations 10000H to 9FFFFH are available for user programs. The first location is 10000H and the last location is 9FFFFH. Calculate the following:
a. The total number of bytes available (in decimal)
b. The total number of kilobytes (in decimal)

9. Identify the addressing mode used in each of the following instructions, and state the size of the operands:
a. MOV DX, [47H]
b. MOV [BP+0DH], DH
c. ADD AX, BP
d. MOV BX, 8H
e. INC AX

10. CPU A has a 8-bit data bus and 16-bit address bus, CPU B has a 16-bit data bus and 32-bit address bus. Give the maximum value that can be brought into the CPU at a time (in HEX and Decimal) and the maximum addressable memory for these two CPUs.

11. Which of the following instructions cannot be coded in 8088/86 Assembly language? Give the reason why not, if any. All numbers are in HEX

a. MOV AX, 27	b. MOV AL, 97F	c. MOV DS, 9BF2
d. MOV CX, 397	e. MOV SI, 9516	f. MOV CS, 3490
g. MOV DS, AX	h. MOV BX, CS	i. MOV CH, AX
j. MOV AX, 23FB9	k. MOV CS, BH	l. MOV AX, DL

12. Assume that SP=FF2EH, AX=3291H, BX=F43CH and CX=09. Find the content of the stack and stack pointer after the execution of each of the following instructions

        PUSH AX
        PUSH BX
        PUSH CX

13. Find the status of the CF, PF, AF, ZF and SF for the following operations

a.	MOV BL, 9FH	b.	MOV AL, 23H	c.	MOV DX, 10FFH
	ADD BL, 61H		ADD AL, 97H		ADD DX, 1

14. Assume that the registers have the following values in HEX and that CS=1000, DS=2000, SS=3000, SI=4000, DI=5000, BX=6080, BP=7000, AX=25FF, CX=8791 and DX=1299. Calculate the physical address of the memory where the operand is stored and the contents of the memory locations in each of the following addressing examples:

a. MOV [DI][BX]+28, CX	b. MOV [SI+BX+8], AH	c. MOV [BX], AX
d. MOV [BP+SI+100], BX	e. MOV [DI+BP+100], AX	