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1. In real-address mode, please calculate a 20-bit address from two 16-bit numbers: 2345h and 3456h, where 2345h is the base address and 3456h is the offset.

DS

|-----|
|2345h| -> *10h -> |23450h| ->[+]-----> [268A6h]
|-----|

BX

|-----|
|3456h| -----
|-----|

2. Instruction MOV copies data from one place to another. The format of this instruction is MOV target, source. Please tell if the following two programs are equivalent in regards to BX's value. Please explain in detail.

a. mov bx, 34h

b. mov bh, 0

mov bl, 34h

A. bx [0034h]

**B. bh [00h] → bx[0034h]
bl [34h]**

yes, they are equivalent.

3. Please write a short program that uses the MOV instruction to exchange values in AH and AL. Suppose AX contains ABCDh prior to running your program. Your program should change the value to CDABh. Feel free to use other registers, introduced in the class.

ax → [ABCDh]

```
mov bl, ah  
mov bh, al  
mov ax, bx
```

ax → [CDABh]

4. Please explain what “instruction pointer register” and “flag register” mean in detail.

Instruction pointer register, also known in IA_32 bit machines as EIP, contains the address of the next instruction to execute, which only the OS can control.

Flag register reflects an outcome or can control how CPUs operate. An example would be setting the flag to one to represent that data will be required or retrieved from the data bus.