Assignment4 of EI209

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1. Suppose that the subtraction is $x - y$. Since $x - y = x + (-y)$, we can first calculate $-y = (y - 1)$'s complement, then add x and $-y$.

2. (a) 1234H+4321H=5555H.
   CF=0, OF=0, SF=0, ZF=0, PF=1.
   (b) 1000H+FFFFH=0FFFH.
   CF=1, OF=0, SF=0, ZF=0, PF=1.
   (c) 1000H−2000H=F000H.
   CF=0, OF=0, SF=1, ZF=0, PF=1.
   (d) F000H+F000H=E000H.
   CF=1, OF=0, SF=1, ZF=0, PF=0.
   (e) 2000H−8000H=A000H.
   CF=0, OF=0, SF=1, ZF=0, PF=1.

3. (a) PA = 25000H, code segment.
   (b) PA = 12000H, data segment.
   (c) PA = 2CA00H, stack segment.

4. M/$\overline{\text{IO}}$

5. It's the time between CPU begin to access memory or I/O and the end. It takes at least 4 clock cycles.

   T_1 : The ALE send high signal, and CPU send address to address latch.

   T_2 : ALE is deactivated and stay low; $\overline{\text{DEN}}$ is set low; CPU set $\overline{\text{RD}}$ or $\overline{\text{WR}}$ to low and send commands to memory or I/O. If CPU is doing writing, it will begin the data output process.

   T_3 (or with T_w): If CPU attempts to read, it will check READY signal; when it turns high, CPU begins to read from memory or I/O. This section's length determined by the actual time.

   T_4 : $\overline{\text{DEN}}$, $\overline{\text{RD}}$ and $\overline{\text{WR}}$ is set high to finish the cycle.

6. SS=3500H, SP=07E0H; SS=3500H, SP=07F2H.

7. The first instruction's address is CS:IP = FFFF0H.
   The reason is that when the computer starts, it needs to execute the instructions in BIOS to load the operating system; FFFFOH lies in the address range of ROM.

8. (1) AX = 0200H
   (2) AX = 2A10H
   (3) AX = 0200H
   (4) AX = 5946H
   (5) AX = 463CH
   (6) AX = 6B59H