**Assignment 1**

**1、What is the range of N bits integers with 2’s complement（补码）? What is the range of N bits integers with 1’s complement（反码）? Are they the same? Explain the reasons.**

**Answer：**

The range of N bit integers with 2's complement is from -2^(N-1) to 2^(N-1) - 1. The range of N bit integers with 1's complement is from -2^(N-1) + 1 to 2^(N-1) – 1. The ranges of N bit integers with 2's complement and 1's complement representations are not the same. The reason why it doesn't reach -2^(N-1) is that there are two representations of 0 (all 0s and all 1s) in 1's complement, which leads to a reduced range.

**2、Represent the following decimal floating numbers using binary numbers following IEEE754 single precision standard.**

**Answer：**

3=0100 0000 0101 1000 0000 0000 0000 0000

-2=1100 0000 0010 0000 0000 0000 0000 0000

**3、Suppose registers E and F contained (AA)hex and (CC)hex, respectively. What bit pattern would be in register D after executing each of the following instructions (see appendix)?**

**Answer：**

1. 7DEF D:(EE)hex
2. 8DEF D:(88)hex
3. 9DEF D:(66)hex

**4、High definition video can be delivered at a rate of 30 frames per second (fps) where each frame has a resolution of 1920 1080 pixels using 3Bytes per pixel. Can an uncompressed video stream of this format be sent over a USB 1.1 serial port? USB 2.0 serial port? USB 3.0 serial port? Why?**

**Answer：**

Total data rate required:(1920 \* 1080) pixels/frame \* 24 bits/pixel \* 30 frames/second = 1,492,992,000 bits per second or 1.49 Gbps (gigabits per second).

USB 1.1 serial port has a maximum data transfer rate of only 12 Mbps, so it can’t.

USB 2.0 serial port has a maximum data transfer rate of only 480 Mbps, so it can’t.

USB 3.0 serial port has a maximum data transfer rate of 5 Gbps, so it can.

**5、The following is a routine encoded in the machine language described in the language description table. Explain (in a single sentence) what the routine does. (Explain what the entire routine does as a unit rather than reciting what each instruction does.) 210F 12A0 8212 32A0**

**Answer：**

The content of the storage unit at address A0 is XORed with 0F, and the result is still stored in the storage unit at address A0.

**6、Suppose the memory cells at addresses 20 through 28 contain the following bit patterns (the program counter contains 20)**

**(1)What bit patterns will be in register 0, 1 and 2 when the machine halts? (2)What bit pattern will be in the memory cell at address 30 when the machine halts?**

**(3)What bit pattern will be in the memory cell at address B0 when the machine halts？**

**Answer：**

（1）The content in register 0 is 32.

The content in register 0 is 21.

The content in register 0 is 12

（2）The content of the storage unit at address 30 is 12.

（3）The content of the storage unit at address B0 is 32.

**7、Using the machine language described in the appendix, write a sequence of instructions that will place a 1 in the most significant bit of the memory cell at address A0 without disturbing the other bits.**

**Answer：**

11A0

2280

7112

31A0

**8、Suppose the registers 4 and 5 contain the bit patterns 3C and C8, respectively. What bit pattern is left in register 0 after executing each of the following instructions:**

**Answer：**

**5045：**04

**7045：**FC

**8045：**08

**9045：**F4

**9、Suppose the memory cells at addresses AF through B1 in the machine described in the Appendix contain the following bit patterns**

**Address Contents**

**AF B0**

**B0 B0**

**B1 AF**

**What would happen if we starte the machine with its program counter containing AF?**

**Answer：**

If we start the machine with the program counter containing AF, it will enter an infinite loop, the machine will enter an infinite loop, repeatedly jumping between the instructions at addresses B0 and AF, without any further execution of instructions.