Introduction to Computer Science-101
Homework 2

1. Show the result of the following operations. (10%)
   a. NOT $(99)_{16}$
   b. NOT $(FF)_{16}$
   c. NOT $(00)_{16}$
   d. NOT $(01)_{16}$

2. Show the result of the following operations. (10%)
   a. $(99)_{16}$ AND $(99)_{16}$
   b. $(99)_{16}$ AND $(00)_{16}$
   c. $(99)_{16}$ OR $(FF)_{16}$
   d. $(FF)_{16}$ OR $(FF)_{16}$

3. Using an 8-bit allocation, first convert each of the following numbers to sign-and-magnitude representation, do the operation, and then convert the result to decimal. (10%)
   a. 19 + 23
   b. 19 - 23
   c. -19 + 23
   d. -19 - 23

4. Show the result of the following floating-point operations using IEEE_127—see Chapter 3. (10%)
   a. 34.75 + 23.125
   b. -12.625 + 451.00

5. Using a 16-bit allocation, first convert each of the following numbers to two's complement, do the operation, and the convert the result to decimal. (10%)
   a. 161 + 1023
   b. 161 – 1023
   c. -161 + 1023
   d. -161 – 1023

6. Compare and contrast the three methods for handling the synchronization of the CPU with I/O devices. (10%)

7. A computer has 64 MB of memory. Each word is 4 bytes. How many bits are needed to address each single word in memory? (10%)

8. An imaginary computer has sixteen data register (R0 to R15), 1024 words in memory, and 16 different instructions (add, subtract, and so on). What is the minimum size of an instruction in bits if a typical instruction uses the following format: instruction M R2 (10%)

9. What is the minimum size of the control bus in the computer in question 8 ? (10%)

10. A computer uses memory-mapped I/O addressing. The address bus uses 10 lines (10 bits). If memory made up of 1,000 words, how many four-register controllers

can be accessed by the computer. (10%)