CSC 230 Assignment 1
Fall 2017

This assignment contains short answer, mostly numeric problems. You need to complete it by typing your answers into ConneX (in the Tests & Quizzes section). The problem set is to be completed online and only requires you to supply the final answer. You can re-take the quiz 4 times. The system will record your best result.

Complete it on conneX by Monday, September 18, 2017 well before 5 am.

Note: It's a good idea to treat these questions as if they were conducted during an exam. As you will be inputting these answer into a 'Quiz' on conneX, please include only the digits of the appropriate number system. In particular, do not precede your answers with '0x' or '0b' or follow your answers with base indicators, like subscript 2 or 10.

1. A processor uses 24 bits for its memory addressing. How many possible distinct locations (in decimal) can the computer address?
2. The computer memory address locations are numbered from 0 to the maximum. If a memory locations' address is $(7243)_{10}$, how is this address represented in binary (base 2), a number system that is much more natural for the computer than decimal?
3. How is the memory address $(7243)_{10}$ represented in hexadecimal (base 16)?
4. What is the maximum 2's complement integer that can be stored in a memory location that stores 24 bits of data? (Give your answer in decimal.)
5. What is the minimum 2's complement (or largest negative) integer that can be stored in a memory location that stores 24 bits of data? (Give your answer in decimal.)
6. Convert the numeral 0x4C3C2B directly to binary.
7. In a memory location that stores 16 bit data, what is the binary representation for the decimal number 1250_{10} in a 2's complement 16-bit binary encoding?
8. Convert -325_{10} into the 2's complement 16-bit binary representation.
9. Convert the octal value 1307_8 into binary.
10. Convert the octal value 1307_8 into hexadecimal.
11. Given two binary numbers 0b10111010 and 0b01001001, perform a bit wise AND operation. Provide the result in binary.
12. Given two binary numbers 0b10111010 and 0b01001001, perform a bit wise OR operation. Provide the result in binary.
13. Given two binary numbers 0b10111010 and 0b01001001, perform a bit wise XOR operation. Provide the result in binary.
14. Given the hexadecimal number 0xA9BC, perform a bit wise NOT operation (complement). Provide the result in hexadecimal.

15. When a binary shift operation is performed binary data can be shifted right or left and a '0' is brought to fill vacated positions while the bit that is shifted out is discarded. Shift the 8-bit binary number that is equivalent to 0x18 right two, give the result in binary.
16. When a binary rotate operation is performed binary data can be shifted right or left: the bit that is shifted out from one end will be brought back in on the other end. Rotate the 8-bit binary number that is equivalent to 0x5B left two, give the result in binary.
17. For an 8-bit (byte) sized binary number, what mask and operation would you use to clear the lower nibble without changing the upper nibble?
    a. Mask (in binary)
    b. Operation