CSE 2312 – Homework #1

Assigned: Thursday, June 8, 2017
Due: Thursday, June 15, 2017 at the end of class

Note the following about the homework:

1. You must show your work to receive credit.
2. If your submission has more than one page, staple the pages. If I have to staple it for you, the cost is 10 points.

Assignment:
For each problem, include units where appropriate.

1. Make the following base conversions.
   (a) 30_{10} to binary
   (b) 40_{10} to hexadecimal
   (c) 101010_2 to decimal
   (d) $0xC6$ to binary
   (e) 1111011_2 to hexadecimal
2. Given the following strings in C (i.e., arrays of characters), what are the ASCII values of the characters stored? You do not need to represent the terminating null. Give your values in hexadecimal.
   (a) "Cat"
   (b) "2017"
3. For each of the following number of bits, how many bit arrangements are there? Do not leave your answer as something to something power. Give the base-10 number as we would normally write the value, for example, 32768.
   (a) 4 bits
   (b) 10 bits
   (c) 12 bits
   (d) 20 bits
4. Express each of these numbers in binary. Assume the number is an 8-bit signed integer that uses two's complement representation.
   (a) -5_{10}
   (b) -16_{10}
   (c) -93_{10}

(d) -127_{10}

5. For each problem below, convert the base-10 numbers to binary and then perform the arithmetic on the binary representation of the numbers. Give the result in binary and base-10, where the base-10 value is by interpreting the result as an 8-bit signed integer in two's complement. If an overflow or carry occurs, say so. By carry, I am only referring to a carry out of the most significant bits added. Assume each number is an 8-bit signed integer that uses two's complement representation.

   (a) $64_{10} + 62_{10}$

   (b) $100_{10} + 30_{10}$

   (c) $-70_{10} + 50_{10}$

   (d) 123_{10} - 14_{10}

6. Express each of these base-10 numbers in binary. For example, 5.5 would be 101.1_2.

   (a) 0.40625

   (b) 17.03125

   (c) 0.65625

   (d) 578.875

7. Represent each of the numbers from problem 6 in the IEEE 754 single precision format. When writing the bits, separate the sign, exponent, and fraction parts to make the results easier to read.

8. Convert these IEEE 754 single precision bit patterns to the equivalent base-10 number.

   (a) `0 | 1000 1001 | 0011 0100 1000 0000 0000 000`

   (b) `0 | 1000 0111 | 0100 1101 1010 0000 0000 000`