COMP 235 — Homework — Ch 4.6 –

1. Consider the following bytes: $x = 0xE4$, $y = 0x6B$, $z = 0xF1$. Compute the following. Show work.

   (a) ~y

   (b) x & z

   (c) y ^ x

   (d) z | y

   (e) ~(y & z)

(f) z « 4

(g) y » 3 (arithmetic)

(h) z » 4 (arithmetic)

(i) z » 4 (logical)

(j) (y « 7) » 7 (arithmetic)

2. Convert the following binary values to decimal.

   (a) 1011.011010

   (b) 0.1101

   (c) 10.001001001

3. Convert the following binary numbers to normalized (leading 1) scientific notation.

   (a) 1011.001

   (b) 0.001001

   (c) 11.010

   (d) 0.011111

4. For simplicity sake, let's consider a 17 bit floating point notation that is the same as what we get in the book but with only 1 byte for the significand. So that is 1 bit for the sign, 1 byte for the exponent (with a bias of 127), and 1 byte for the significand. For each of the following bit strings, list the binary number it represents in scientific notation and the value in decimal.

   (a) 1 00010110 00001110

   (b) 0 11010011 11011111

5. Give the binary string to represent the following binary values using the same 17 bit floating point number representation listed above.

   (a) 110.111

   (b) -1.011×2^{27}

6. (Bonus!?) Show how to represent these decimal values using the 17 bit floating point representation from the previous problem.

   (a) -13.6875

   (b) 0.087890625