CS1356 Introduction to Information Engineering

Homework 3

1. Convert each of the following binary representation into its equivalent base ten representation

   a. 11.01 b. 100.0101 c. 0.1101
   d. 1.0 e. 10.001

2. Express each of the following values in binary notation.

   a. $5\frac{1}{4}$ b. $\frac{1}{16}$ c. $7\frac{7}{8}$
   d. $1\frac{3}{4}$ e. $6\frac{5}{8}$

3. Decode the following bit patterns using the floating point format described as follows.
   (a) The first bit, from left to right, is for sign. 0 for positive numbers; 1 for negative numbers.
   (b) The next three bits are for exponent. The exponent uses excess notation, whose range is from -4 to 3.
   (c) The last four bits are for mantissa, whose value is in the range [1, 2).

   a. 01011010 b. 11001000
   c. 00101100 d. 10111001

4. Encode the following numbers to the 8-bit floating point format described in problem 3, and indicate which one has a truncation error.

   a. $\frac{1}{2}$ b. $7\frac{1}{2}$ c. $-3\frac{3}{4}$
   d. $\frac{5}{32}$ e. $\frac{31}{32}$