Elementary Numerical Analysis

2008 년 2 학기

HW#1: Binary Representation of Real Numbers

Due Sept. 11

In this problem set, you will practice how to represent a real number using floating point representation and examine the number of significant digits available with a finite number of bits for mantissa. Use any programming language you are familiar with (but, preferably FORTRAN). Two MATLAB programs (dec2bin.m and bin2deci.m, ETL 자료실) are given for your reference.

1. Give an algorithm to find the mantissa and the exponent of the binary floating point representation of an arbitrary positive decimal number.

2. Write a program that converts an arbitrary positive decimal number to a binary floating point number. Use the parts of the sample program which contains the conversion of an integer to a binary number and also the conversion of a decimal number to a binary number. Use the decimal number itself and the number of bits available for the mantissa as the input parameters. Output should be the binary mantissa, the sign of the exponent, and the binary exponent given in a row vector form.

3. Analyze the relation between the number of bits for mantissa and the error of the binary representation by experimenting with various numbers for different numbers of bits.

4. Determine the number of significant digits for the standard single and double precision representation of numbers.