In the name of God

Department of Physics
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ADVANCED COURSE ON COMPUTATIONAL PHYSICS

Exercise Set 2

(Due Date: 1403/07/30)

1. Rounding error in computer: Suppose to have single precision for floating point representation. In this case compute $5.5+10^{-8}$ =? (Hint: to this end use floating point representation and then add two representations).

2. Floating point representation:
A : For Single precision paradigm, compute minimum and maximum values of a positive number (except to "0" and "$+\infty$")
B : For Double precision paradigm, compute minimum and maximum values of a positive number (except to "0" and "$+\infty$")

3. Error analysis and propagation: Using the "data.txt" file, write a proper program to do following tasks:
A : Read input data file which contains more than 10^6 one-column data. and spilt it to 100 input files.
B : Making directories and send each data set to corresponding directory.
C : Compute mean, variance and mean standard deviation of each data set. And write them in a file which contains the label of data, mean, standard deviation and mean standard deviation. Finally plot them.

4. Suppose that a typical secondary quantity, z is computed by $z = \tanh(x^2) + e^y$. According to data files ("xnew.txt" and "ynew.txt"), determine series for z including corresponding error. Plot all data file. (Hint: each input data file contains 3 columns. The first column is just label, the second column is quantity and third column is error.)

Good luck, Movahed