

In the name of God

# Department of Physics Shahid Beheshti University

## COMPUTATIONAL PHYSICS

### Exercise Set 2

(Due Date: 1401/12/18)

1. Error analysis and propagation: Using the input 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.
2. Suppose that a typical secondary quantity,  $z$  is computed by  $z = \tanh(x^2) + e^y$ . According to data files, 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. )
3. Embedding data in higher dimension: Time Delay Embedding algorithm is a common method to embed a series ((1+1)-D) to higher dimension. Such method is widely-used in many data analysis programs. Suppose  $D = 2$  and for different values of time-delay,  $\tau = 10$ ,  $\tau = 100$  and  $\tau = 1000$ , plot the point clouds and compare your results. (Hint: Look at the "Datatypes.pdf" for more details.)

Good luck, Movahed

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