Computational Physics Homework # 300.

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When you hand in the homework, you should gather all your files into a single tarball file as follows.

- Use an unix command `tar -czf <file name>.tar.gz <file 1> <file 2> ···`.
- For undergraduate students, put a copy of a tarball <file name>.tar.gz into a directory:

  `/physics/upload/comp2023/<user-ID>`.
- For graduate students, put a copy of a tarball <file name>.tar.gz into a directory:

  `/physics/upload/acomp2023/<user-ID>`.
- You must use the GNU `make` command and `Makefile` to compile the code starting from the homework `hw101`.

Statistical Data Analysis

1. In the class, you learned how to use file I/O in C. Please find a data file "data.104" and "data.105". Make a code according to the following instructions:

   - Make a code which can read in the data files "data.104" and "data.105". Do not assume that you know the total size of the file. Make a general code which can work regardless of the file size.

- While reading in the data, determine the size of the data: how many data points are there in the data file?
- Store the data into a stucture made of array of numbers. There must be two data sets: d_1 (data.104) and d_2 (data.105).
- Let us define the data objects: add = d_1 + d_2, sub = d_1 - d_2, mul = d_1 * d_2 and div = d_1/d_2.
- Obtain the average of the data sets: add, sub, mul and div.

$$\bar{x} = \frac{1}{N}\sum_i x_i$$

- Obtain the variance σ^2 of the mean or the error of the average of the data sets: add, sub, mul, and div.

$$\sigma^2 = \frac{1}{N(N-1)}\sum_i (x_i - \bar{x})^2$$

- Print the average, variance of the mean into a file named "stat.data" in the following format for each data sets:

  average = x.xxxxxxx
  variance of the mean = y.yyyyyyy