EL2208 Problem Solving with C Lab. Lab #10

Computing "curving grades"

Use praktikum.ee.itb.ac.id server as usual.

The subject of "curving grades" comes up regularly when teaching classes. Contrary to popular opinion, curves are not always to the student's advantage. Consider the grading scheme shown in Table 1.

Table 1.

Grade	Numeric Score (x)
A	$\mu + 1.5\sigma \leq x$
B	$\mu + 0.5\sigma \leq x < \mu + 1.5\sigma$
C	$\mu - 0.5\sigma \leq x < \mu + 0.5\sigma$
D	$\mu - 1.5\sigma \leq x < \mu - 0.5\sigma$
F	$x < \mu - 1.5\sigma$

The Greek letter σ (sigma) is the standard deviation, μ (mu) is the average and an individual's grade is **x**.

Several functions are needed in order to compute this grade. The main program will contain only variable declarations and function calls within it's body. Be sure to include the function prototypes prior to the first line of **main**. For declaration purposes, assume that there are no more than 100 grades in the input file.

- The main program will call an input function that reads a list of grades following a first-line sentinel. The file you need for this exercise is called **lab10.in**. Download this file from the **labs** subdirectory on **praktikum.ee.itb.ac.id** via anonymous FTP. Take a look at the content of **lab10.in** and decide how to read the data from this file. Read the list of grades (**x**) into an array. The input function will have a return value equal to the number of grades (the first-line sentinel) in the list. Use **fopen/fscanf/fclose** to access the data in the input file.

  PROTOTYPE: **int read_input(double x[]);**

- A function will be used to compute the average (μ) and the standard deviation (σ) of the grades in the array. Pass the number of elements in the array (**n**) and the array (**x**) to this function. The function computes the average and then compute the standard deviation using the formula :

$$\sigma = \sqrt{\frac{\sum_{i=0}^{n-1} x_i^2}{n} - \mu^2}$$

PROTOTYPE: **void stat(double x[], int n, double *mu, double *sigma);**

- An output function will print the following data shown below to a file called **"lab10.out"**. Use **fopen/fprintf/fclose** to print the data in the following format:

```
Average            :    82.33
Standard Devitation:    12.95
Numeric Grade      Letter Grade
     83.96            C
     75.25            D
     78.14            C
     84.78            C
      .               .
      .               .
      .               .
```

The output function will require the array, the length of the array, the average (μ) and the standard deviation (σ) to be passed as inputs. Use an **if/else if/else** construct to determine the letter grade based on the criteria given in the table above. This function will not return a value so it will be of type **void**.

PROTOTYPE: **void print_output(double x[], int n, double mu, double sigma);**

Show the lab instructor the completed code and accompanying output when you are done.

Submit the code using perl submitter.