Practice of Information Processing
Midterm Assignment
2024/10/23

1. The program displaying score sheet: score_sheet.c

   The sample program score.c is a program that displays the test scores of 10 students in 3 subjects. Here, 10 students are assumed to be assigned ID numbers of 0-9. Modify this program and create a program score_sheet.c that displays the score sheet of the corresponding student when you enter the ID number with the keyboard.

   The following items should be displayed on the score sheet. If there are numbers after the decimal point, display up to two digits after the decimal point.

   ① ID number

   ② The names of three subjects（SUB1, SUB2, SUB3）

   ③ The score for each subject and the summation (total score) of three scores

   ④ Averaged score for each subject and averaged total score

   ⑤ Rank (A～D）based on the following criteria

range of total scores			Rank
270	～	300	A
240	～	269	B
210	～	239	C
0	～	209	D

   ⑥ Message, advise to students（Options：Please devise comments on the judgment results, pointing out subjects that the student is not good at, etc.）

Optionally, try to add the following items as well.

⑦ Deviation value of each subject of the student.

The deviation value T_i is given by the following formula.

$$T_i = \frac{10(x_i - \mu)}{\sigma} + 50 \quad \text{where} \quad \mu = \frac{1}{N}\sum_{i=1}^{N} x_i$$

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

N：total number of students, x_i：score for i-th student,

μ：average, σ：standard deviation

⑧ Ranking based on total points

Please find the ranking based on the total score. The student with the highest total score will be ranked first.

* Tips: For sorting, use "bubble sort" or "selection sort".

2. The program calculating roots of arbitrary quadratic equations: root.c

For arbitrary real numbers a, b and c, solve the quadratic equation, $ax^2 + bx + c = 0$ using the formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ or $x = \frac{2c}{-b \pm \sqrt{b^2-4ac}}$.

- The two solutions should be displayed even if they are complex numbers.
- Optionally, try to output the most accurate answer possible. For example, consider the case of $a = 1, b = 4, c = 10^{-12}$.
  (Hint: $x \simeq 0, -b/a$ when c is very small.)

Deadline: November 5th

The following should be submitted to Google Classroom.

(Mandatory)

- Source codes: score_sheet.c, root.c
- Explanations of the two programs including their execution results: report1_(Student ID).pdf

(Optional)

- Related/in-depth works and demonstrations by yourself