Course Name	**:** Algorithms and Programming
Project - 1	**:** Hemophilia Prophylaxis Management System
Project Issue/Announcement Date	**:** 06.12.2024 Friday, 23:59
Deadline for Creating Groups	**:** 09.12.2024 Monday, 23:59
Source Code Submission Date	**:** 15.12.2024 Sunday, 23:59
Late Source Code Submission Date	**:** 17.12.2024 Wednesday, 23:59

GENERAL INFORMATION

Hemophilia Disease: Proteins that play a role in the coagulation process are called clotting factors. The deficiency of these factors results in coagulation disorders, generally referred to as bleeding disorders. The most common bleeding disorders are Hemophilia-A, which is known as factor-8 protein deficiency, and Hemophilia-B, which is known as factor-9 protein deficiency.

Severity of Hemophilia: In individuals without hemophilia, the clotting factor level in the blood (expressed with %) is between 50% and 150%. The severity of hemophilia is determined according to the clotting factor level in the blood as follows:

Factor level in the blood (%)	**Severity of Hemophilia**
Less than 1	Severe
1 or greater than 1 and 5 or less than 5	Moderate
Greater than 5 and less than 50	Mild

Treatment of Hemophilia: Hemophilia patients use medications called factor-8 or factor-9, depending on the type of disease, either during bleeding episodes or as a preventive treatment (prophylaxis). The required medication dose (expressed with IU) is calculated based on the patient's weight, the level of factor in the blood, and the target factor level according to the type of bleeding. When 1 IU of factor-8 medication per kilogram is given, the factor-8 level in the blood increases by approximately 2%. When 1 IU of factor-9 medication is given per kilogram, the factor-9 level in the blood increases by approximately 1%. The factor medication produced from human blood is called "plasma-derived factor" (P) and the factor medication produced in the laboratory is called "recombinant factor" (R). The price of 1 IU of plasma-derived factor is $0.3 and the price of 1 IU of recombinant factor is $0.4.

Presence of Inhibitor: The immune system of some hemophilia patients may perceive the given factor medication as a foreign substance and produce antibodies to fight it. This reduces or eliminates the effectiveness of the factor medication taken. If the amount of antibody produced against the relevant factor protein is 5 BU or higher, the patient is considered as an inhibitor-positive patient.

Prophylaxis: Prophylactic treatment (Prophylaxis) is provided to severe hemophilia patients without inhibitors or moderate hemophilia patients who have experienced an average of three or more bleeding episodes per month in the past year. Hemophilia A patients receiving prophylaxis use the determined amount of factor medication three times a week, while Hemophilia B patients use it twice a week. The minimum amount of factor medication a patient needs per dose is calculated to increase the factor level in the patient's blood to 40%. Since factor medications come in vials of 250, 500, 1000, 1500, and 2000 IU, patients use the minimum number of vials required to meet their calculated dose. For example, a patient who needs a minimum of 2110 IU of medication at one time, uses 1 vial of 2000 IU and 1 vial of 250 IU (totaling 2250 IU of medication).

PROBLEM DEFINITION

The Social Security Institution (SSI) of Turkey has included prophylaxis treatment in its reimbursement scheme to improve the quality of life for hemophilia patients. In this context, the factor level and inhibitor tests of the patients are repeated once a year, and eligible patients receive prophylaxis for one year. Medications for four weeks are sent periodically to patients on prophylaxis. Accordingly, it is requested to develop a program to identify hemophilia patients eligible for prophylaxis, to calculate the necessary medication amounts and to obtain some statistical information about hemophilia patients. For this purpose, the following data will be entered into the program for each hemophilia patient:

- TR identification number: text
- Name and surname: text
- The deficient factor protein's number: integer (8 or 9)
- Factor-8 or factor-9 level in blood (%): real number (0 or greater than 0 and less than 50)
- The amount of antibody in blood produced against factor medication (BU): real number (0 or greater than 0)
- If the severity of disease is moderate, the number of bleeding episodes in the past year: integer (0 or greater than 0)
- If he/she will be included in the prophylaxis program, his/her weight (kg): real number (0 or greater than 0)
- If he/she will be included in the prophylaxis program, the production type of factor medication to be used (Plasma-derived/Recombinant): text (P/p/R/r characters)

After a patient's data is entered, the following information should be printed on the screen for that patient:

- TR identification number
- Name and surname
- Type (A/B) and Severity (Severe/Moderate/Mild) of the disease
- Whether or not prophylaxis will be applied
- If prophylaxis will be applied:
    - The factor medication to be used (factor-8/factor-9, plasma-derived/recombinant)
    - How many times a week to use the medication (2/3)
    - Minimum required dose of medication at one time (IU)
    - Amount of medication to be used at one time (IU), types and quantities of vials
    - Total amount of medication for 4 weeks (IU), types and quantities of vials
    - Total medication cost for 4 weeks ($)

After that, the user should be asked if there are any other patients (e/E/h/H characters). If there are any, the procedures for the next patient should be performed, if not, the following statistical information should be printed on the screen:

- Numbers of Hemophilia-A, Hemophilia-B and all patients
- Numbers and percentages of patients with severe, moderate and mild hemophilia
- Percentages of inhibitor presence in Hemophilia-A and Hemophilia-B patients individually

- Numbers and percentages of patients receiving prophylaxis for Hemophilia-A and Hemophilia-B individually
- The percentage of patients receiving prophylaxis among hemophilia patients whose disease severity is moderate
- Percentages of patients using plasma-derived and recombinant factor medications among Hemophilia-A and Hemophilia-B patients receiving prophylaxis individually
- Total plasma-derived and recombinant factor-8 and factor-9 medication amounts (IU), types and quantities of vials to be sent to all patients for 4-weeks prophylaxis
- 4-weeks and 1-year factor medication costs ($) for prophylaxis covered by the SSI
- Average annual total medication amount (IU) and cost ($) per patient for prophylaxis covered by the SSI
- TR identification numbers, names and surnames, disease severities, weights, production types of medications used (plasma-derived/recombinant), 4-weeks total medication amounts (IU) and costs ($) of patients with the highest 4-weeks medication amount for Hemophilia-A and Hemophilia-B individually
- TR identification number, name and surname, type and severity of the disease, weight, production type of medication used (plasma-derived/recombinant), 4-weeks total medication amount (IU) and cost ($) of the patient with the highest 4-weeks medication cost

Notes:

1. During data entries, the user must be provided to enter in accordance with the restrictions specified in parentheses. Additionally, data must be retrieved in the specified order.
2. Real number outputs should be printed with precision up to 2 digits after the decimal point, but the real value of the numbers should be preserved.
3. Assume that sufficient data will be entered to avoid a division by zero error.
4. For the requests to find the largest value, assume that there is only 1 entity (patient) with this value.
5. It is recommended that you design your algorithm (write pseudocode) before you start coding.
6. This project is expected to be done within the topics covered so far (up to nested loop structures), it is not expected to create and/or use subprograms (functions).
7. Test your program by creating sample inputs and outputs to test different situations before submitting the project. (You can save time by pasting inputs in batches to the console instead of entering them one by one.)
8. The project will be done in groups of two, whoever wants can do it alone. However, those who take the course again and are not responsible for the weekly practice quizzes (who do not attend the practice courses) have to do the project alone:

05170000111	05210000230	05220000286	05220001014	05230000355
05170000813	05210000270	05220000293	05220001018	05230000369
05180000083	05210000276	05220000318	05220001031	05230000399
05190000088	05210000294	05220000330	05220001035	05230000958
05190000089	05210000934	05220000334	05220001048	05230000968
05200000021	05210001034	05220000343	05220001140	05230000999
05200000109	05210001048	05220000362	05220001162	05230001153
05200000747	05210001187	05220000378	05220001232	05230001154
05200000958	05220000017	05220000952	05220001308	05230001158
05210000003	05220000180	05220000979	05230000301	DGSM2400041
05210000149	05220000284	05220000996	05230000318	DGSM2400060

9. Those who will do the project as a group of two should enter the group information they created on the form at https://forms.gle/Fb9HAYtmgYtAvMgq5 until 09.12.2024 Monday, 23:59.
10. It is recommended that those who create two-person groups use the pair programming method (https://en.wikipedia.org/wiki/Pair_programming) during the code writing phase.
11. If you have any questions, please use the forum opened for this project on the relevant course page on the https://egeders.ege.edu.tr website. Also, follow the forum for possible updates and/or clarifications.
12. Although this project is not a very difficult project, it may take your time. So, start doing your project right away.
13. Do the project yourself, especially avoid sharing code with your friends.

POINTS TO BE CONSIDERED:

Submission of Assignment:

- The source code file (.py extension), with the filename consisting of the combination of the student numbers of the group members and the underscore character (for example, 05090004219_05090004235.py), should be uploaded using the relevant course page on the https://egeders.ege.edu.tr website by one of the group members.
- Source code file can be uploaded to the system repeatedly, but it should be noted that only the most recently uploaded file is stored in the system. In addition, after the upload process is completed, check the file and make sure that the file is uploaded to the system without any problems.
- A maximum delay of 2 days will be accepted in the delivery of the source code, but a 20% deduction will be made in the grade.

Evaluation of the Project:

1. In the evaluation of the project; in addition to the correct and complete operation of the program, compliance with the structural programming principles (using constants, meaningful variable/constant names, comments, etc.) and effectiveness (avoiding unnecessary operations and unnecessary code repetitions, etc.) will also be taken into account. Accordingly, the scoring is as follows:
   - Compliance with structured programming principles: 10 points
   - Effectiveness: 10 points
   - Correct and complete operation of the program: 80 points
2. Projects whose source codes are found to be more than a certain amount of similarity will be deducted at the same rate or these projects will receive zero.