

**ASSIGNMENT 2**  
**PROGRAMMING TECHNIQUE 1**  
**SEM 1, 2020/2021**

**INSTRUCTIONS TO THE STUDENTS**

- This assignment must be done **in pairs** (group consisting of 2 members).
- Please refer to the group list to find out your group members.
- Your programs must follow the input and output as required in the text and shown in the examples. You must test the programs with (but not limited to) all the input given in the examples.
- Any form of plagiarisms is **NOT ALLOWED**. Students who copied other student's program/assignment will get **ZERO** mark (both parties, student who copied and student that share their work).
- Please insert your **name and partner's name, matrices number and date** as a comment in your program.

**SUBMISSION PROCEDURE**

- Please submit this assignment no later than **December 27, 2020, Sunday (00:00 MYT)**.
- Only one submission per pairs (group) that includes two files are required for the submission which is the source codes (the file with the extension .cpp).
- Submit the assignment via the UTM's e-learning system.

**QUESTION 1 (Pre-defined functions)**

Write a complete C++ program that helps you to calculate a number of words, characters, spaces and punctuations in a string. The program should perform the following steps. (Note: that the values in *italics* are input by the user while the values in **bold** are the final result for each problem)

1. The program should ask the user to enter a string.
2. The program should be able to calculate number of words, characters, spaces, punctuations, number of uppercase and lowercase letters in the string that entered in step (1).
3. List or display all the words found in the string that entered in step (1). Please list the words without any punctuations and then display it using uppercase letters.
4. Display the number of words, characters, spaces, punctuations, number of uppercase and lowercase letters in the string that entered in step (1).
5. The program will be repeated as long as user entered sentinel value that equal to 'Y' or 'y', otherwise the program will be terminated.

The program execution will be depicted as follows:

Enter a string: *Hi!!! Good Luck???*

List of words in the string above:

Word 1 = **HI**  
Word 2 = **GOOD**  
Word 3 = **LUCK**

Number of words = **3**  
Number of spaces = **2**

```

Number of punctuations = 6
Number of characters = 18
Number of uppercase letters = 3
Number of lowercase letters = 7

Do you want to enter a new string? [Press 'Y' to continue]: y

Enter a string: Try Again... Smile? Are you OK?!..

List of words in the string above:
Word 1 = TRY
Word 2 = AGAIN
Word 3 = SMILE
Word 4 = ARE
Word 5 = YOU
Word 6 = OK

Number of words = 6
Number of spaces = 5
Number of punctuations = 8
Number of characters = 34
Number of uppercase letters = 6
Number of lowercase letters = 15

Do you want to enter a new string? [Press 'Y' to continue]: n

Thank you for using our system

```

## QUESTION 2 (User-defined Functions)

A hospital supply company wants to market a program to assist with the calculation of intravenous rates. Design and implement a program that interacts with the user as follows.

Write a complete C++ program that helps the company to calculate intravenous rates. The program should perform the following steps. (*Note*: that the values in *italics* are input by the user while the values in **bold** are the final result for each problem)

1. Provide a menu driven screen for user to select the problem choice.
2. If the user enters **1**, the program should ask the user
  - a) to enter the rate of intravenous drop in ml/hr
  - b) to enter the intravenous tubing drop factor (drops/ml)
 From the given information, calculate and display the intravenous drop rate per minute. The screen displays for problem 1 is as in **Figure 1**.
3. If the user enters **2**, the program should ask the user
  - a) to enter input rate in mg/hr
  - b) to enter the patient weight in kg
  - c) to enter the concentration rate of the drug in mg/hr
 From the given information calculate and display rate in millilitres per hour. The screen displays for problem 2 is as in **Figure 2**.

INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.

| GIVEN A MEDICAL ORDER IN              | CALCULATE RATE IN |
|---------------------------------------|-------------------|
| (1) ml/hr & tubing drop factor        | drops/min         |
| (2) mg/kg/hr & concentration in mg/ml | ml/hr             |
| (3) QUIT                              |                   |

Problem => 1

Enter rate in ml/hr => 150

Enter tubing's drop factor(drops/ml) => 15

The drop rate per minute is **38**.

**Figure 1:** Screen Display for Problem 1

INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.

| GIVEN A MEDICAL ORDER IN              | CALCULATE RATE IN |
|---------------------------------------|-------------------|
| (1) ml/hr & tubing drop factor        | drops/min         |
| (2) mg/kg/hr & concentration in mg/ml | ml/hr             |
| (3) QUIT                              |                   |

Problem => 2

Enter rate in mg/hr => 0.6

Enter patient weight in kg => 70

Enter concentration in mg/ml => 1

The rate in millilitres per hour is **42**.

**Figure 2:** Screen Display for Problem 2

4. If the user enters **3**, the program will display the screen as in Figure 3.

INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.

| GIVEN A MEDICAL ORDER IN              | CALCULATE RATE IN |
|---------------------------------------|-------------------|
| (1) ml/hr & tubing drop factor        | drops/min         |
| (2) mg/kg/hr & concentration in mg/ml | ml/hr             |
| (3) QUIT                              |                   |

Problem => 3

You have chosen to quit the program.

Thank you for using our system.

**Figure 3:** Screen Display for Problem 3

5. If the user enters any other problem number besides 1, 2 or 3, the program will display the screen as in **Figure 4**.

```
INTRAVENOUS RATE ASSISTANT
```

```
Enter the number of the problem you wish to solve.
```

```
      GIVEN A MEDICAL ORDER IN          CALCULATE RATE IN
(1) ml/hr & tubing drop factor          drops/min
(2) mg/kg/hr & concentration in mg/ml    ml/hr
(3) QUIT
```

```
Problem => 6
```

```
Please run the system again and choose a problem number between 1
and 3.
```

**Figure 4:** Screen Display for Invalid Problem Choice

To assist the company in developing the program, you should implement the following functions:

**getProblem** – A function with no input parameters. It will display the user menu, then inputs and returns from the function the value of the problem number selected.

**getRateDropFactor** – This is a non-returning function which prompts the user to enter the data required for problem 1, and sends this data back to the calling module through the use of reference parameters.

**getKgRateConc** – This is also a non-returning function which prompts the user to enter the data required for problem 2, and sends this data back to the calling module through the use of reference parameters.

**figDropsMin** – This function takes rate and drop factor as input parameters and it returns the value of drops/min (rounded to the **nearest** whole drop, for example 23.2 to 24 and 23.7 to 24).

**byWeight** – This function takes as input parameters rate in mg/hr, patient weight in kg, and concentration of drug in mg/ml and it returns the value ml/hr (rounded, for example 26.2 to 26 and 26.6 to 27). *Note:* Formula to calculate rate in ml/hr = rate in mg/hr × weight in kg × concentration of drug in mg/ml.

Your program should also be written to show the implementation of a loop(s).

On the whole, the program execution for all problem choices will be depicted as follows:

```
INTRAVENOUS RATE ASSISTANT
```

```
Enter the number of the problem you wish to solve.
```

```
      GIVEN A MEDICAL ORDER IN          CALCULATE RATE IN
(1) ml/hr & tubing drop factor          drops/min
(2) mg/kg/hr & concentration in mg/ml    ml/hr
(3) QUIT
```

```
Problem => 1
```

```
Enter rate in ml/hr => 150
```

```
Enter tubing's drop factor(drops/ml) => 15
```

```
The drop rate per minute is 38.
```

```
Enter the number of the problem you wish to solve.
```

```
      GIVEN A MEDICAL ORDER IN          CALCULATE RATE IN
(1) ml/hr & tubing drop factor          drops/min
(2) mg/kg/hr & concentration in mg/ml    ml/hr
(3) QUIT
```

Problem => 2  
Enter rate in mg/kg/hr => 0.6  
Enter patient weight in kg => 70  
Enter concentration in mg/ml => 1  
The rate in millilitres per hour is **42**.

Enter the number of the problem you wish to solve.  
GIVEN A MEDICAL ORDER IN                      CALCULATE RATE IN  
(1) ml/hr & tubing drop factor                      drops/min  
(2) mg/kg/hr & concentration in mg/ml                      ml/hr  
(3) QUIT

Problem => 3  
You have chosen to quit the program.  
Thank you for using our system.

For choices which are not in the range of 1 to 3 example -1 or 6:

Problem => 6  
Please run the system again and choose a problem number between 1 and 5.