LAB 2 — Arrays and Control Structures

1. Problem A

1.1 Specification

Write a C program to count the number of digits ('0', '1', '2', ..., '8', '9') in a line of characters. The program reads from the standard input a line of characters and outputs the number of digits found in the line. Compute the sum of all the digits found and output that sum. If the input line contains no digits, the sum is 0.

2.2 Implementation

The program should:

- be named `lab2a.c`
- use `getchar` and a loop to read a line of characters. The loop terminates when a new line character '`\n`' is entered.
- display the following prompt before each input line:

  ```
  Enter a line of characters>
  ```

- display on the standard output the number of digits found in the input line and the sum of all the digits, separated by a **tab** character **`'\t'`**.

2.3 Sample Inputs/Outputs:

```
indigo 352 % lab2a
Enter a line of characters>Welcome to CSE2031, "Software Tools".
4     6
indigo 353 % lab2a
Enter a line of characters>0123456789
10    45
indigo 354 % lab2a
Enter a line of characters>a b c d e f g h
0     0
indigo 355 %
```

2. Problem B

2.1 Specification

Write a C program to input a set of integers, store them in an array, find the maximum and minimum values of the set, and display those two values.

2.2 Implementation

- The program is named `lab2b.c`
- Allocate an array of size 100. The array size should be declared as a constant.
- Use a loop and `scanf` to read one integer at a time and place it into the array. The loop terminates when the input is a zero. Store the zero in the array as well (i.e., the last element of an array is always a zero).
- Display before each input the following prompt:

  `Enter the next array element>`
- Find the maximum and minimum values of the set of integers stored in the array (including the last element, which is a zero).
- Display the maximum and minimum values on the standard output, in that order and separated by a **tab** character **`'\t'`**.
- Assume that all inputs are valid and that the number of input integers is less than 100.

2.3 Sample Inputs/Outputs

```
indigo 360 % lab2b
Enter the next array element>10
Enter the next array element>2
Enter the next array element>-34
Enter the next array element>15
Enter the next array element>-20
Enter the next array element>0
15    -34
indigo 361 % lab2b
Enter the next array element>-100
```

```
Enter the next array element>-20

Enter the next array element>0

0     -100

indigo 362 %
```

3. Problem C

Repeat problem A, but do not display the prompt "`Enter a line of characters>`". Name this program lab2c.c.

4. Problem D

Repeat problem B, but do not display the prompts "`Enter the next array element>`". Name this program lab2d.c.

Common Notes

All submitted files should contain the following header:

```
/**************************************
*     EECS2031 – Lab 2
*     Filename:  Name of file
*     Author: Last name, first name
*     Email: Your preferred email address
*     EECS login ID: Your EECS login ID
**************************************/
```

In addition, all programs should follow the following guidelines:

- Include the `stdio.h` library in the header of your `.c` files.
- Use `printf` to print text and outputs according to the required formats.
- End each output result with a new line character '`\n`'.
- Do not use any C library function except `getchar(), putchar(), scanf()` and `printf()`.
- **Assume that all inputs are valid (no error checking is required on inputs).**