BIRZEIT UNIVERSITY

Computer Science Department

COMP2310 (Fall 2024/2025)

Assignment #1

Notes:

1. The assignment should be submitted by ***Thursday. 17/10/2024 by 11:59 pm on Ritaj (Late Assignments will not be accepted for any reason).***
2. The assignments are ***individual*** effort and copying the assignment will be treated as a cheating attempt, which may lead to *FAILING* the course.

Create a Java program (using Eclipse) that functions as a scientific calculator. The program should allow users to perform various mathematical operations. To access these features, users must enter a valid user ID.

Part 1: User ID Validation

1. **User Input:**
   - The program should prompt the user to enter their first name and a 9-digit ID number.
2. **ID Validation:**
   - Implement a method called `isValidID` to validate the ID. If the ID is invalid, the program should repeatedly ask the user for a valid ID or give the option to enter `-1` to exit the program.
3. **Validation Steps:**
   - **Step A: Make sure that the id number is exactly 9 digits.**
   - **Step B:** Assume there are weights below each digit of the id number (as shown below), alternating between 1 and 2, starting from the rightmost digit.

```
ID Number: 2 0 2 3 4 5 6 7 4
Weights:   1 2 1 2 1 2 1 2 1
```

   - **Step C:** Multiply each digit of the ID by its corresponding weight:

```
Multiplied: 2 0 2 6 4 10 6 14 4
```

   - **Step D:** If the result of a multiplication is a two-digit number, sum the digits to get a single digit.

```
For example, 14 becomes 1 + 4 = 5, and 10 becomes 1 + 0 = 1.
Results: 2 0 2 6 4 1 6 5 4
```

   - **Step E:** Sum all the digits of the results:

```
Sum: 2 + 0 + 2 + 6 + 4 + 1 + 6 + 5 + 4 =30
```

   - **Step F:** Check if the sum is divisible by 10. If it is, the ID is valid. If not, it is invalid.

Part 2: Scientific Calculator Menu

After entering a valid ID, the program should display a menu with the following options:

1. **Calculate Sine, Cosine, and Tangent**:

   - The user can enter an angle in degrees, assume the entered value is always valid (*no checking required*).
   - Implement a method `calculateTrigFunctions` to:
     - Convert the angle from degrees to radians.
     - Calculate and display the sine, cosine, and tangent values using `Math.sin()`, `Math.cos()`, and `Math.tan()`.

2. **Calculate Factorial**:

   - Allow the user to enter a positive integer and calculate its factorial.
   - Implement a method `calculateFactorial` to compute the factorial using a loop.

3. **Decimal to Hexadecimal Conversion**:
   - Allow the user to input a positive integer and convert it to **Hexadecimal** format.
   - Implement a method `decimalToHex` to perform this conversion, **you are NOT allowed to use built-in Java methods such as `Integer.toHexString()` or similar.**

4. **Exit**:

   - The program should display "Goodbye!" before terminating.

The menu should keep appearing to the user to make any choice until option 4 (Exit) is selected.

<u>The following is an example sample run of your program:</u>

```
Welcome to the Scientific Calculator!

Please enter your first name: Ahmad

Please enter your 9-digit ID number: 202345674

ID is valid!

Welcome, Ahmad! Please select an option from the menu:

1. Calculate Sine, Cosine, and Tangent

2. Calculate Factorial
```

```
3. Decimal to Hexadecimal Conversion

4. Exit


Enter your choice: 1

Enter an angle in degrees: 45

Sine(45) = 0.7071

Cosine(45) = 0.7071

Tangent(45) = 1.0000


1. Calculate Sine, Cosine, and Tangent

2. Calculate Factorial

3. Decimal to Hexadecimal Conversion

4. Exit


Enter your choice: 2

Enter a positive integer: 5

5! = 120


1. Calculate Sine, Cosine, and Tangent

2. Calculate Factorial

3. Decimal to Hexadecimal Conversion

4. Exit


1. Calculate Sine, Cosine, and Tangent

2. Calculate Factorial

3. Decimal to Hexadecimal Conversion

4. Exit


Enter your choice: 3

Enter a positive integer: 26
```

```
Hex representation of 22 is 1A


1. Calculate Sine, Cosine, and Tangent

2. Calculate Factorial

3. Decimal to Hexadecimal Conversion

4. Exit


Enter your choice: 4

Goodbye!
```

VERY IMPORTANT:

1. Submit your assignment **by responding directly to the course coordinator's message** on **Ritaj** and attaching your code file(s) to the reply.

2. Ensure that each class file begins with a comment including your full name, student ID number, and both your lecture and lab section numbers.

3. Any late or incorrect submissions (**even by one minute**) or submissions not sent as a reply to the coordinator's message EXACTLY as instructed will not be graded and will result in a zero. **NO EXCEPTIONS for ANY REASON**.