BACS2023 Object-Oriented Programming
Practical #1

Required Tools

Before you start to code and execute your Java programs, installations of the following tools are required:

- ***Java SE Development Kit (https://www.oracle.com/java/technologies/downloads/#jdk21-windows)***
- ***Integrated development environment (IDE), Apache NetBeans (https://netbeans.apache.org/download/index.html)***

Question 1

Write a Java program that obtains the following input from the user:

- Name
- Current year of study
- Target GPA for this semester

Then display a welcome message with the details that was input earlier. A sample dialog is shown below:

```
Enter name: Phua Chu Kang
Enter your year of study: 2
What is your target GPA for this semester? 3.75

Welcome Phua Chu Kang!
Work hard to achieve your target GPA of 3.75 this semester of your Year 2.
```

Question 2

Write a Java program that prompts the user to enter his / her age. The program should then calculate and display the user's age in terms of days and seconds, as shown below:

```
--------------------Configuration: <Default>--------------------
Enter your age (years): 20
Age in years: 20 years
Age in days: 7300 days
Age in seconds: 630720000 seconds

Process completed.
```

Note: Practice good programming style:

- Follow the standard Java naming convention
- Define and use constants for permanent data and values that never changes

Question 3

Write a Java program that validates a credit card number. The last digit of a credit card number is the check digit, which protects against transcription errors such as an error in a single digit or switching two digits.

The program should prompt the user to enter an 8-digit number, and will print out whether the number is valid or not. If it is not valid, it should print the value of the check digit that would make it valid.

Use the following method for verifying the credit card:

- Starting from the rightmost digit, form the sum of every other digit. For example, if the credit card number is 4358 9795, then you form the sum

  $$5 + 7 + 8 + 3 = 23$$

- Double each of the digits that were not included in the preceding step. Add all digits of the resulting numbers. For example, with the number given above, doubling the digits, starting with the next-to-last one, yields

  18 18 10 8

  Adding all digits in these values yields $1 + 8 + 1 + 8 + 1 + 0 + 8 = 27$.

- Add the sums of the two preceding steps. If the last digit of the result is 0, the number is valid. In our case, $23 + 27 = 50$, so the number is valid.

Question 4

a) Briefly describe the steps in the problem-solving process for Object-Oriented Design.

b) Distinguish between Structured Programming and Object-Oriented Programming in terms of their focus area.