I. Problem: Imagine you are a developer tasked with creating a simple utility program for a weather app. This app needs to help users convert temperatures between Celsius and Fahrenheit. Write a menu-driven Java program that offers the user the option to convert a given temperature from Celsius to Fahrenheit or from Fahrenheit to Celsius. Make sure the user can choose which conversion they want to perform and input the temperature value themselves.

II. Problem: As a software engineer for a geometry learning application, you need to develop a feature that helps students calculate the area and perimeter of different shapes. Write a menu-driven Java program that allows users to choose between finding the area and perimeter of a rectangle or a circle. The program should prompt the user to input the necessary dimensions (length and width for a rectangle, radius for a circle) and then display the calculated area and perimeter.

III. Problem: You are working on a personal finance app that needs to categorize numbers entered by the user. Write a Java program that reads a number and determines if it is positive or negative. After identifying the nature of the number, the program should then check if it is odd or even and display the appropriate messages.

IV. Problem: As part of an introductory coding exercise, you need to demonstrate the use of switch-case statements in Java. Write a Java program that reads two numbers from the user and uses a switch-case structure to find and display the maximum of the two numbers.

V. Problem: You are teaching a course on advanced Java techniques, and you want to show the power of bitwise operators. Write a Java program that swaps the values of two given numbers using bitwise operators, demonstrating a non-traditional method of swapping values without using a temporary variable.

VI. Problem: In a language learning app, you need a feature that helps users identify whether a given letter is a vowel or a consonant. Write a Java program that reads a letter from the user and determines whether it is a vowel (a, e, i, o, u) or a consonant, then displays the result.

VII. Problem: As part of a calendar utility feature, you need to determine if a given year is a leap year. Write a Java program that takes a year as input and checks whether it is a leap year. The program should display an appropriate message indicating whether the year is a leap year or not.

VIII. Problem: You are developing an educational platform and need to implement a grading system based on students' percentage scores. Write a Java program that reads a student's percentage score and assigns a grade based on the following criteria:

- Percentage >= 90% : Grade A
- Percentage >= 80% : Grade B
- Percentage >= 70% : Grade C
- Percentage >= 60% : Grade D
- Percentage >= 40% : Grade E
- Percentage < 40% : Grade F

IX. Problem: You are creating a number analysis tool that checks for specific divisibility rules. Write a Java program that reads a number and uses a ternary operator to check if the number is divisible by both 7 and 11. The program should display an appropriate message based on the result.

X. Problem: As part of a project on binary manipulation, you need to write a program that allows users to explore the binary representation of numbers. Write a Java program that reads a number and an index *n* from the user and uses bitwise operators to determine and display the value of the n^{th} bit of the number.

XI. **Problem: You are working on a graphical interface for a star pattern generator in a children's learning application. This feature needs to display various star patterns to engage young users. Write a Java program that outputs the following star pattern:**

```
    *
   ***
  *****
 *******
*********
```

XII. **Problem: Imagine you are developing an educational tool for students learning number patterns. Your task is to create a feature that generates a specific numeric pattern, helping students visualize number sequences. Write a Java program that outputs the following pattern:**

1
12
123
1234
12345
1234
123
12
1

XIII. Problem: You are tasked with creating a fun and interactive feature for a math and art integration project in a children's educational app. The goal is to generate an engaging pattern that mixes numbers and stars to captivate young learners. Write a Java program that outputs the following mixed pattern:

1
2
3
*****4*****
5
6

XIV. Problem: You are developing an art-inspired programming challenge for an online coding camp. The challenge is to create intricate patterns using basic programming concepts. Your task is to write a Java program that generates a visually appealing hollow diamond star pattern, which will be showcased as part of the camp's digital art exhibition. The pattern should look like this:

```
   *
  * *
 *   *
*     *
 *   *
  * *
   *
```

XV. Problem: As part of a mathematical exploration feature in an educational software for young mathematicians, you need to create a tool that generates Pascal's Triangle. This tool will help students understand combinatorial mathematics and binomial coefficients. Write a Java program that outputs Pascal's Triangle up to a given number of rows. For instance, for 5 rows, the output should be:

```
    1
   1 1
  1 2 1
 1 3 3 1
1 4 6 4 1
```

Perform all the **BOLD** question in lab and remaining question you need to perform as a home assignment.