**Practical Assignments in Java for LP II**

**Class BCA 4th A**

For advanced learners in Java, a practical assignment involving command line arguments, control statements, arrays are designed to deepen their understanding and challenge their problem-solving skills. Here's an assignment:

**Objective:** The objective of this assignment is to reinforce understanding and mastery of java practical concepts through a series of progressively challenging tasks.

**Basic Loop Practice:**

Qus 1.1 Write a Java program that prints all the prime numbers between 1 and 100.

Implement this using both for and while loops.

Qus 1.2 Write a Java program to print Pascal's Triangle of n rows.

Use nested loops to calculate the values.

Qus 1.3 Implement the factorial calculation using recursion instead of loops.

Compare the performance and resource usage with the loop-based version.

Qus. 1.4 Write a Java program to find and print the prime factors of a given number.

Use loops to iterate through possible factors.

This assignment provides a range of challenges to engage advanced learners in loop concepts and their practical applications in Java programming.

**Command Line Arguments:**

Qus 2.1 Implement a command-line calculator that takes arithmetic expressions as command-line arguments and evaluates them.

Support basic arithmetic operations like addition, subtraction, multiplication, and division. For example: java Calculator 5 + 3

Qus 2.2 Implement a password generator that takes command-line arguments to specify the length of the password and which character sets to include (e.g., uppercase letters, lowercase letters, numbers, special characters).

These problems should provide a range of challenges for advanced learners and give them practical experience with using command-line arguments in Java applications.

**If else conditions and switch case:**

Qus 3.1 Write a program that takes a student's score as input and prints out their corresponding grade based on the following scale:

90-100: A

80-89: B

70-79: C

60-69: D

Below 60: F

Implement the same with if elseif else and switch-case statements.

Qus 3.2 Write a program that takes three integers as input representing the lengths of the sides of a triangle and determines whether the triangle is equilateral, isosceles, or scalene.

Qus 3.3 Write a program that converts an amount in one currency to another based on the user's choice. The program should prompt the user to enter the amount, the source currency, and the target currency (e.g., USD to EUR). Use a switch-case statement to handle different currency conversions.

**Arrays in java:**

Qus 4.1 Write a program to rotate an array to the left or right by a given number of positions.

Qus 4.2 Write a program that takes an array of integers as input and removes duplicate elements, returning an array with only unique elements.

Qus.4.3 Write a program that rotates a given N x N matrix 90 degrees clockwise.

Qus 4.4 Write a program that calculates the sum of each row and each column in a 2D matrix and displays the results.

Qus 4.5 Given a 2D matrix representing a map where '1's represent land and '0's represent water, write a program to count the number of islands. An island is surrounded by water and is formed by connecting adjacent lands horizontally or vertically.

Qus 4.6 Write a program that checks whether a given square matrix is a magic square or not. A magic square is a square matrix where the sum of each row, each column, and both diagonals is the same.

These problems offer advanced learners a chance to deepen their understanding of 1d & 2D arrays, matrix operations, and problem-solving techniques in Java. They cover a range of topics, from basic operations to more complex algorithms and matrix manipulation.