Java Assessment

Question 1) You are tasked with creating a **School Management System** that involves managing details of **Teachers** and **Students** and their relationship with **Courses**. The system should cover the following topics:

**1. Classes and Objects:**

* Create classes for Person, Teacher, Student, and Course.
* Use objects to represent individual students, teachers, and courses.

**2. Class Constructor:**

* Use constructors to initialize the Person, Teacher, Student, and Course objects with appropriate attributes like name, age, course name, and credits.

**3. Polymorphism:**

* Implement polymorphism by overriding the displayInfo() method in both Teacher and Student classes. The Teacher class should display details of the teacher (e.g., subject taught), and the Student class should display details of the student (e.g., enrolled courses).

**4. Method Overloading:**

* Implement method overloading in the Student class. Create two enrollInCourse() methods:
  + One that accepts a Course object as an argument.
  + Another that accepts a String (course name) and int (course credits).

**5. Method Overriding:**

* Override the displayInfo() method in the Teacher and Student classes to show personalized details for each. For example, the Teacher class should display the teacher’s subject, and the Student class should display the student's enrolled course.

**6. Inheritance:**

* Use inheritance to create a base class Person, from which both the Teacher and Student classes will inherit common attributes like name and age.

**7. Interface:**

* Create an interface AssignGrades with a method assignGrade(Student student, String grade). Implement this interface in the Teacher class to assign grades to students.

**8. Abstract Class:**

* Create an abstract class Person with two abstract methods: getDetails() and displayInfo(). The Teacher and Student classes should implement these abstract methods to provide specific information about the teacher and student.

**Requirements:**

1. The Teacher class should have attributes like name, age, and subject.
2. The Student class should have attributes like name, age, enrolledCourse, and grade.
3. The Course class should have attributes like courseName and credits.
4. Create an appropriate main method that demonstrates the creation of Student and Teacher objects, enrolling students in courses, and assigning grades.

Question 2) Design a Java program that performs various string operations and uses control statements for user input validation. The program should allow the user to perform the following operations:

* 1. Concatenate Strings: The user can enter two strings and the program should concatenate them.
  2. Find Length of a String: The user can enter a string, and the program should display its length.
  3. Convert to Uppercase and Lowercase: The user can enter a string, and the program should display it in both uppercase and lowercase.
  4. Extract Substring: The user can enter a string and specify the starting and ending index, and the program should extract and display the substring.
  5. Split a Sentence: The user can enter a sentence, and the program should split it into words and display them.
  6. Reverse a String: The user can enter a string, and the program should reverse and display it.
  7. Requirements:
     1. Use control statements (if-else, switch, loops) for input validation and handling possible errors.
     2. Implement a user-friendly console interface for the user to interact with the program.
     3. Cover all string concepts, such as concatenation, length, uppercase and lowercase conversion, substring extraction, splitting, and reversal.