

Exercise 1

Create a class `Rectangle` with the following specifications:

- Attributes:
 - `length` (double)
 - `width` (double)
- Constructor:
 - A constructor that takes `length` and `width` as parameters and initializes them.
- Methods:
 - `calculateSurface()`: returns the surface area of the rectangle.
 - `toString()`: returns a string in the following format:
"I am a rectangle :) ! My length = 10.0 cm, my width = 5.0 cm, and my surface = 50.0 cm²."
- Test the class by creating a `Rectangle` object and displaying its details.

Exercise 2

Create a `Person` class representing an individual with the following specifications:

- Attributes:
 - `title` (String): Example. "Mr." or "Mrs."
 - `lastName` (String)
 - `firstName` (String)
 - `birthYear` (int)
- Constructors:
 - A constructor that initializes all attributes.
 - A constructor that initializes only the `title` attribute.
- Methods:
 - Getters and setters for each attribute.
 - `toString()`: returns a string like: "Mr. Ahmed Salim, born in 1965."
 - `calculateAge(int currentYear)`: returns the person's age based on the given year.
- Create a main method (`public static void main(String[] args)`), in which:
 - Create an object `p1` using the `Person` constructor with the values: Title: "Mr.", Last Name: "SidAhmed", First Name: "Salim", Birth Year: 2000
 - Create an object `p2` using the constructor that initializes only the `title`, setting it to "Mrs."
 - Initialize `p2` attributes to the following values: Last Name: "SidAhmed", First Name: "Aicha", Birth Year: 2005
 - Display `p1` details using the `toString()` method.
 - Display `p2` attributes individually.
 - Calculate and display the age of `p2` using the `calculateAge()` method with a given current year.

Exercise 3

Create a `MainClass` containing only the `public static void main(String[] args)` method, in which:

- Create an object `p1` using the `Person` constructor with the values:
 - Title: "Mr."
 - Last Name: "Ahmed"
 - First Name: "Salim"
 - Birth Year: 1970
- Create an object `p2` using the constructor that initializes only the title, setting it to "Mrs."
- Initialize `p2` attributes to the following values:
 - Last Name: "Ahmed"
 - First Name: "Aicha"
 - Birth Year: 1980
- Display `p1` details using the `toString()` method.
- Display `p2` attributes individually.
- Calculate and display `p2`'s age using the `calculateAge()` method with a given current year.

Exercise 4

In the package `geometry`, create a class `Circle` with the following specifications:

1. Attribute:
 - `radius (double)`: represents the radius of the circle.
2. Constructors:
 - A constructor that takes `radius` as a parameter and initializes it.
 - A copy constructor that creates a new circle by copying another existing circle.
3. Methods:
 - `calculateSurface()`: returns the surface area of the circle using the formula $\pi \times \text{radius}^2$.
 - `expand(Circle c, double dr)` (static method): adds the value `dr` to the radius of the given circle.
 - `toString()`: returns a string in the format:
"Circle with radius = 10.0 cm, and surface = 314.16 cm²."
4. In the package `mainPackage`, create a class `MainClass` containing the `main` method, where:
 - Create an object `c1` by asking the user to input the radius via the keyboard.
 - Create an object `c2` using the copy constructor on `c1`.
 - Display `c2`'s radius and surface area.
 - Ask the user for a value `dr`, then modify `c2` using `expand(c2, dr)`.
 - Display `c2`'s radius and surface area after the modification.
 - Compare the values before and after the modification and observe the impact on the object.