

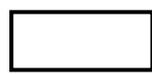


### ASSIGNMENT (7)

#### Question (1):

Create a class that defines a **Rectangle**. A rectangle has two attributes: height and width. The class also contains the following methods and constructors:

- A default constructor, with no parameters, that initializes the width and height to 1.
- Another constructor, with two parameters, that initializes the values of width and height.
- Two methods for *setting* the height and the width of the rectangle. The methods should also validate these values (i.e. width and height must be positive values).
- Two methods for *getting* the height and the width of the rectangle.
- A method that returns the area of the rectangle,  $area = height \times width$ .
- A method that returns the perimeter of the rectangle,  $perimeter = 2 \times (height + width)$ .
- A method that determines whether the rectangle is a vertical rectangle, a horizontal rectangle, or a square (according to its height and width).



Horizontal



Vertical



Square

In the main function:

- Create two **Rectangles** using two different constructors for each.
- The program asks the user to enter the width and height of each rectangle.
- Then, the program compares the **area** of the two rectangles and prints all the information of the larger rectangle (i.e. width, height, area, perimeter, and shape).



**Question (2):**

Create a class that defines a **Bank Account**. An account is defined by four attributes: **Number**, **Balance**, **Type** (e.g. Current, Saving, Checking, etc.), and **Currency** (e.g. US Dollar, Egyptian Pound, Euro, etc.).

This class contains the following methods:

- A default constructor that initializes the attributes as follows:  
Account Number: -999, Balance: 0, Account Type: Saving, Currency: Euro.
- Four methods for setting the value of each attribute.
- Four methods for getting the value of each attribute.
- A method to withdraw a given amount from the balance. This method must validate that the withdrawal amount is less than the balance. The method prints an appropriate message if the balance is less than the withdrawal amount.
- A method to deposit a given amount into the balance.
- A method that adds an annual interest of 11% to the balance.
- A method that prints the information of the account.

In the main function:

- Create one object of type **Account**.
- The program asks the user to enter the data of the account (through the setters), using the following data as an example:  
**Number:** 8800438  
**Type:** Current  
**Currency:** Egyptian Pounds  
**Balance:** 40000
- The user **deposits** an amount of (1000) into the account.
- Then, the user **withdraws** an amount of (1650) from the account.
- Then, the user attempts to **withdraw** an amount of (70000) from his account, but the withdrawal function refuses to carry out this transaction and prints the appropriate message.
- One year has passed, and therefore the annual **interest** function is applied on the account's balance (i.e. the balance is incremented by 11%).
- The user makes an **inquiry** about the account, and therefore the following message appears:





**Question (3):**

Create a class called **Arithmetic**. This class has only a single attribute which is **number**. The class also contains the following methods and constructors:

- A default constructor, with no parameters, that initializes the number to 1.
- One method for **setting** the value of the number, and validating this value to be greater than or equal to zero.
- One method for **getting** the value of the number.
- An iterative method that returns the factorial of the number.
- An iterative method that returns the Fibonacci of the number.
- A method that returns the squared value of the number.
- A method that determines whether the number is even or odd.
- A method that determines whether the number is a prime number or not.

In the main function:

- Create two objects of **Arithmetic**.
- Set the attribute value for each of the two objects.
- For each object, the program prints the number, its factorial, Fibonacci, squared value, whether it is even or odd, and if it is a prime number or not.

