Lab 7: Object-oriented programming(Without inheritance)

Objective(s)

- To be able to use classes and objects in Python.

Tool(s)/Software

- Pycharm
  or
- IDLE (Python 3.10 or above)
  or
- https://www.online-python.com/

Description

- Write python programs that solve the following problems:

Tasks/Assignments(s)

Q1:

Write a Python program to create a **class** named Bankaccount, which should have the following object attributes:

- **idNumber,**
- **holdername,**
- **balance**

It will then have the following methods:

- **__init()__ :** To initialize the object's attributes
- **deposit():** where the user will enter the amount to be added to the balance and display the new balance
- **withdraw():** where the user will enter the amount to be deducted from the balance and display the new balance

  Note: if the amount to withdraw is greater than the available balance, a message must be displayed to the user "Insufficient balance "

- **display():** display all the information about the bank account
- **bankfees():** display the balance remaining after deducting the 5% of the bank fees

Once this class has been written, write a program that creates an object of the class with all the object's attributes as argument. Call all the object methods.

Example of output:

```
Hello!!! Welcome to you bank account

 Idnumber= 16168891

 account holder name=  Ali Hamza

 Net Available Balance= 22300
Enter amount to be Deposited: 1200
Amount Deposited: 1200.0

 your new balance: 23500.0
Enter amount to be Withdrawn: 500
You Withdrew: 500.0

 your new balance: 23000.0

 your new balance deducting after 5% fees= 21850.0
>
```

Q2.

Write a Python program to create a **class** named **Item** with the following specifications:

- **Object attributes**: *name(type is string),Unit_ price(type is float), quantity(type is integer)*
- **Class attribute:** *pay_rate set to 0.8 (the discount is 20%)*
- __init__() function to initialize the object's attributes:
  a. **In order to set the values of the object, the price have to be positive otherwise the program will raise the following AssertionError: Price is not greater than or equal to zero. Use the keyword . Use the keyword assert to test the condition.**
  b. The Quantity have to be to be positive otherwise the program will raise the following an AssertionError: Price is not greater than or equal to zero. Use the keyword assert to test the condition

- **Methods:**
  a. calc_total_price () to return the *Total= Unit_price * quantity*
  b.`apply_discount()` to return the Total * .*pay_rate*

Then, Create **TWO objects**: *item1 and item 2 from the class Item* and display Total price after discount for object item 1.
Update the pay_rate for the item 2 to 0.7 and display the Total price after discount.

Example of output:

item1 = Item("Phone", 100, 5)

item2 = Item("Laptop", 1000, 3)

Price of item 1 after discount of 20%= 400.0
Price of item 2 after discount of 30%= 2100.0

Q3.

Write a Python program to create a **class** named rectangle, which should have the following object attributes:

- **width**
- **length**
- **name**

It will then have the following methods:

- __init__(): to initialize the object's attributes.
- area(): to return the area of rectangle.

Once this class has been written, write a program that creates an object of the class and **prompts** the user to enter the width and length. The data should be stored as the object's attributes. Use the object methods to display the area.

Q4.

Write a Python program to create a **class** named vector2D, which should have the following object attributes:

- **x**
- **y**

It will then have the following methods:

- **__init__():** to initialize the object's attributes.
- **add():** to add 2 vectors

- **sub():** to substruct 2 vectors

Once this class has been written, write a program that creates two objects of the class. Use the object methods to print the vectors attributes, the result of the addition of 2 vectors and the result of the substruction of 2 vectors.

Example of output:

```
first vector 5 7
second vector 3 9
x of the addition 8
y of the addition 16
x of the substruction 2
y of the substruction -2
>
```

Deliverables

- Submit the files via blackboard. If blackboard is not working, send an email.
- No submissions or late submissions are penalized (from participation marks).
- Name the document Python_Lab7-_StudentName_Q#
- You need to submit 4 files.

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Q1:

Write a Python program to create a **class** named **student** with the following specifications:

- **Attributes**: *full_name and age*
- __init__() function to create a new object.
- Get_age() to return the age of the student

Then, create a **child** class called **NewStudent** that would **inherit all attributes** from the parent class **student**. The child class have, also, an attribute **Section** and method called ***get_age*** to print the **print the age of the student .**

Create **one objects**: *S1* from the **class Newstudent** and display the age of the student**.**

Q2:

Write a Python program to create a **class** named **Books** with the following specifications:

- **Attributes**: *Title, Quantity, Author and Price*.
- __init__() function to create a new object.
- **Method**: *displayInfo* to print the *Title, Quantity, Author and Price*.

Then, create a **child** class called **Book_details** that would **inherit all attributes and method** from the parent class **Books**. The class *Book_details* have, also, a method called ***displayYear*** to print the **year of publication of the book which is given as parameter**.

-Create **TWO objects**: *book1* and *book2* from the **class Book__details** and display all **properties** of the books**.**

The first book is published in 1999, **display** the year of publication of book1.

Expected output:

```
The Alchemist , Quantity: 31 Author: P.Coelho price: 75 SR
How to plan , Quantity: 20 Author: R.Scutella price: 99 SR
Year of publication of book 1999
```

Q3:

Write a Python program to create a **class** named **Room** with the following specifications:

- **Attributes**: *Name, side_length_1, side_length_2*.
- __init__() function to create a new object.
- **Method**: *get_area()* to return the *area of the room. Area= side_length_1* side_length_2*.

Then, create a **child** class called **BedRooms** that would **inherit all attributes and method** from the parent class **Room**. The class *BedRooms* have, also, an attribute called **direction(north,south,west,East)** and method called ***get_perimeter ()*** to return the **perimeter of the bedroom**. Perimeter=2*(*side_length_1+side_length_2)*

-Create **TWO objects**: *Kitchen from the class Room* and *MasterBedroom* from the **class BedRooms** and display the area of the kitchen and both area and perimeter of the the master bedroom.

Example of output:
Area Kitchen is 35 m^2 big
Perimeter Master bedroom is 14
Area Master bedroom is 12 m^2 big.

Q4:

Write a class named Pet, which should have the following attributes:

- **__name**
- **__animal_type**
- **__age**

It will then have the following methods:

- __init__()
- set_name()
- set_animal_type()
- set_age()
- get_name():returns the name of the animal
- get_animal_type():returns the type of the animal
- get_age(): returns the age of the animal

Once this class has been written, create a class **cat** that will inherit all attributes and methods of the class pet.

Write a program that creates an object of the class **cat** and prompts the user to enter the name, type, and age of the pet. The data should be stored as the object's attributes. Use the object's accessor methods (Getters) to retrieve the pet's name, type, and age and display on the screen.

Example of output:

Please enter your pet s name: Minou
What type of animal is your pet?Persian cat
What is the age of your pet?1
pet name is Minou
pet type is Persian cat
pet age is 1.0

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