OBJECT ORIENTED PROGRAMMING 2 LABORATORY
Experiment # 8:
Classes

OBJECTIVES

The main purpose of this experiment is to introduce you to Python Classes. In this experiment, firstly, definition of classes, __init__ method, accessor and mutator methods are examined. Then, some examples are studied.

QUESTIONS

1) Write a Python program to implement the Pet Class.

    i) Use **three private data attributes** for the name of a pet (name), for the type of animal that a pet is (animal_type), for the pet's age (age).
    ii) Use __init__ method to initialize name, animal_type and age.
    iii) Write appropriate accessor and mutator methods.

Draw UML Class Diagram for Pet class by using Visio.

Once you have written the class, write a driver program that creates an object of the class and prompts the user to enter the name, type, and age of his or her pet. This data should be stored as the object's attributes. Use the object's accessor methods to retrieve the pet's name, type, and age and display this data on the screen.

2) Write a Python program to implement the Line Class.

    iv) Use **four private data attributes** for x and y coordinates of the start and end of the line such as sX, sY, eX, eY.
    v) Use __init__ method to initialize sX, sY, eX, eY values with 0.0.
    vi) Include *setStartPoint* method which receives x and y coordinates of start point and returns nothing.
    vii) Include *setEndPoint* method which receives x and y coordinates of end point and returns nothing.
    viii) Include *calculateMagnitude* method which receives nothing and return nothing. In function, **calculate** and **print** magnitude of the line segment. Use following formula:

$$|L| = \sqrt{(s_x - e_x)^2 + \left(s_y - e_y\right)^2}$$

    ix) Include *calculateAngle* method which receives nothing and return nothing. In function, **calculate** and **print** angle of the line segment **with x-axis.** Use following formula:

$$< L = tan^{-1}\left(\frac{e_y - s_y}{e_x - s_x}\right)$$

    x) Include __str__ method to print data attributes of the Line class. The output must be in the following format **P1(sX , sY) -------> P2(eX , eY)**.

xi) Include *outputProperties* method which receives nothing and returns nothing. In function, call *calculateMagnitude* and *calculateAngle* functions.

Draw UML Class Diagram for Line class by using Visio.

Test your program with following driver program. Output of the program must be same which is given the right part.

```
1 import line
2
3 def main():
4
5     my_line1=line.Line()
6     my_line2=line.Line()
7     my_line3=line.Line()
8
9     my_line1.set_startPoint(3,4)
10    print(my_line1)
11    my_line1.outputProperties()
12
13    my_line2.set_endPoint(0,10)
14    print(my_line2)
15    my_line2.outputProperties()
16
17    my_line3.set_startPoint(10,0)
18    my_line3.set_endPoint(25,0)
19    print(my_line3)
20    my_line3.outputProperties()
21
22 main()
```

```
P1(3,4) --------> P2(0.0,0.0)
Magnitude is  5.0
Angle is  -126.8699
P1(0.0,0.0) --------> P2(0,10)
Magnitude is  10.0
Angle is  90.0000
P1(10,0) --------> P2(25,0)
Magnitude is  15.0
Angle is  0.0000
```

3) An admin of a web site wants to provide reliable passwords for their customers. At the beginning, the web site must prompt the password from the customer. Then, if the password meets the following criteria, print "Valid Password". Otherwise, print "Invalid Password" and prompt the password again. This process must be continued until a valid password is entered.

- At least eight characters long
- Contains at least one digit (0-9)
- Contains at least one uppercase letter
- Contains at least one lowercase letter
- Contains at least one character that is neither a letter nor a number

Design a class for the problem.
Use UML Class Diagram to depict the class.