CS116 – Lab 8
Due Date:November 30

Purpose: As programming tasks get more complex, it is helpful to package things up into convenient groupings. A popular way to do this is with a `class` which describes data as well as functions (called methods) which can manipulate that data, all combined into one easy to use computational structure. We can then create different instances of these data/method collections called `objects`. Each object has its own data, independent of other objects. We will see several different ways that structuring data and code that manipulates it in this way can make your programming tasks easier.

Knowlege: This lab will help you master the following content knowledge:

- How to use and create objects
- How to create a new class by inheriting from existing class
- How to create a new class entirely from scratch
- How to have the class contain data using instance variables

Task: Before starting this lab, you should have read Chapter 17 in your text. Follow the steps in this lab carefully and complete the assignments.

Assignment 1:

Your text explains the Turtle class and some of the methods that turtle objects are able to perform. You will create a subclass of Turtle called DrunkTurtle. This new class will contain a method `randomWalk(self)` in which the turtle randomly chooses a heading in one of the four dirctions and moves 10 units. The turtle should do this repeatedly until the turtle reaches the edge of the world.

You will want to `import random` to generate the random direction. The expression `random.randint(0,3)` will generate a random value of 0, 1, 2, or 3.

You may also want to use the turtle methods:

1. getXPos()
2. getYPos()
3. getModelDisplay()
4. setHeading(direction)

A "ModelDisplay" is a world that the turtle is wandering around within. You may want to use the following methods for a world:

1. getWidth()

2. getHeight()

Criteria for Success: Create a `World` object and then create a `DrunkTurtle` object within the world. Use your `randomWalk` method for your turtle and observe the drunken walk displayed within the world.

Assignment 2:

Write a function which creates a world, places multiple DrunkTurtle objects within the world, and has each of the turtles perform a random walk using your method.

Criteria for Success: You will see multiples drunken paths within your world.

Assignment 3:

Write a class from scratch called `Song`. When you create new instances of Song objects you will provide parameters for the title of the song as well as a file name containing a sound. Besides the title and sound, your Song objects should have an instance variable containing a count of the number of times the song has been played.

The methods for this class (besides `__init__`):

1. `getTitle(self)`
2. `play(self)`
3. `getTimesPlayed(self)`

Critieria For Success: Create a Song object using your new class, providing the title and filename. Play the song a couple of times using your `play` method. Then use the `getTimesPlayed` method and check that the count returned is correct.

Assignment 4:

Write a class from scratch called `Playlist`. Initially when you create a Playlist object it should contain an instance variable which is an empty list. You will have a method `setSong(self, song)` which will add the given Song object to your list. You will have another method `playTitle(self, title)` which will search the playlist for a song with the given title and then play that song (using the Song method, of course).

Criteria For Success: Create a couple of Song objects. Then create a Playlist object. Use the `setSong` method to add each of the Song objects into your Playlist. Finally, use the `playTitle` method and verify that it plays the correct song.

Submit your files containing your classes. Please indicate both partner names in your submission files.