The purpose of this programming assignment is to generate a canvas that plots different colored points at random locations.

Specification

The program consists of two parts:

- A Point class that defines a blueprint for a 2D point; and
- A CoordinateSystem class that manages a Tkinter Canvas and plots Point objects in random colors onto the canvas.

Point Class

When designing your Point class, make sure to address the following:

- A constructor which takes two parameters - `x` and `y`.
- The default values of `x` and `y` in the constructor should be 0.0 and 0.0.
- Getters and setters for `x` and `y`
- A subroutine named `dist`, which takes two points as input and returns the distance between the two points[1]. One of the two inputs should be `self`.
- A subroutine named `midpt`, which takes two points as input and returns the mid point between the two points[2]. One of the two inputs should be `self` and the returned object should be a Point object.
- Finally, the `__str__` function which returns string in the format of `(x,y)`
- Create various Point objects and test your class!

CoordinateSystem Class

This class (which will inherit from Tkinter's Canvas class) will initialize a canvas on which the points will be plotted.

- The CoordinateSystem class must inherit from Tkinter's Canvas class and fill the entire Tkinter window.
- A subroutine named `plot` should take an instance of a Point and a color as input – and plot the specified point on the canvas in the specified color[3];
- A subroutinection named `plotPoints` should take the number of points to plot as input (set to 5,000 by default), generate the points (each should be randomly generated and of a randomly chosen color), and call the `plot` subroutine to plot each point;
- Plotted points should be individual instances of your Point class, each with random X- and Y-components that are within the width and height of the canvas (set to 800x800 by default);
- Plotted points should have a radius of 0 (i.e., a point is made up of a single pixel);
- Points should be plotted in a random color from the following set of colors: `black, red, green, blue, cyan, yellow, and magenta`. Feel free to add more colors!

[1] `https://www.mathsisfun.com/algebra/line-midpoint.html`
[2] `https://www.mathsisfun.com/algebra/distance-2-points.html`
[3] `https://www.geeksforgeeks.org/python-tkinter-create-different-shapes-using-canvas-class/`

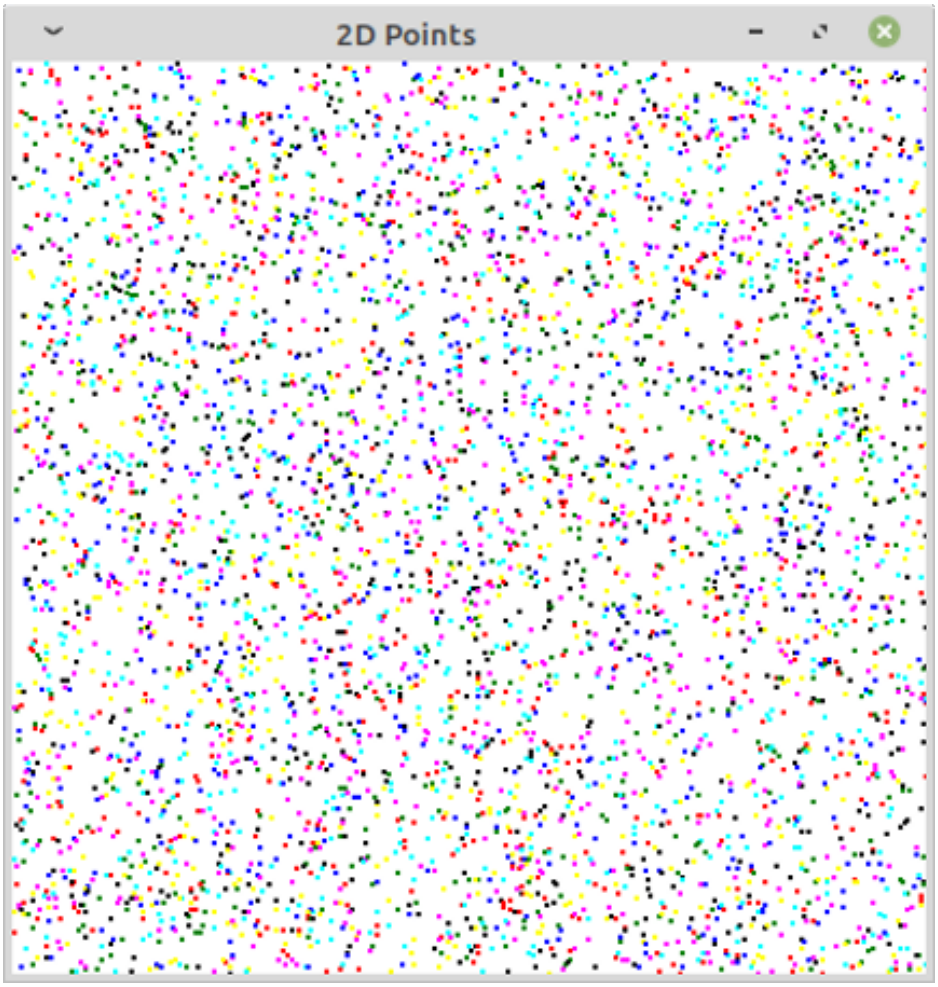

Figure 1: Sample Output

Deliverable

- Submit the Point.py and CoordinateSystem.py. Both classes can also be present in the same file.

Rubric

Item	Points
Good coding style	2
Appropriate Comments & Header	4
Point class	3
Point class constructor	3
Point class getters	4
Point class setters	4
CoordinateSystem class	4
CoordinateSystem plot subroutine	4
CoordinateSystem plotPoints subroutine	4
Output is correct	8
Total	40

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