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Computational Geometry
Assignment
Lab 1: Implementation of Geometric Objects

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Date: 20-July-2022

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Lab 1: Write a program to implement following geometric objects

1. Point
2. Line Segment
3. Ray
4. Line

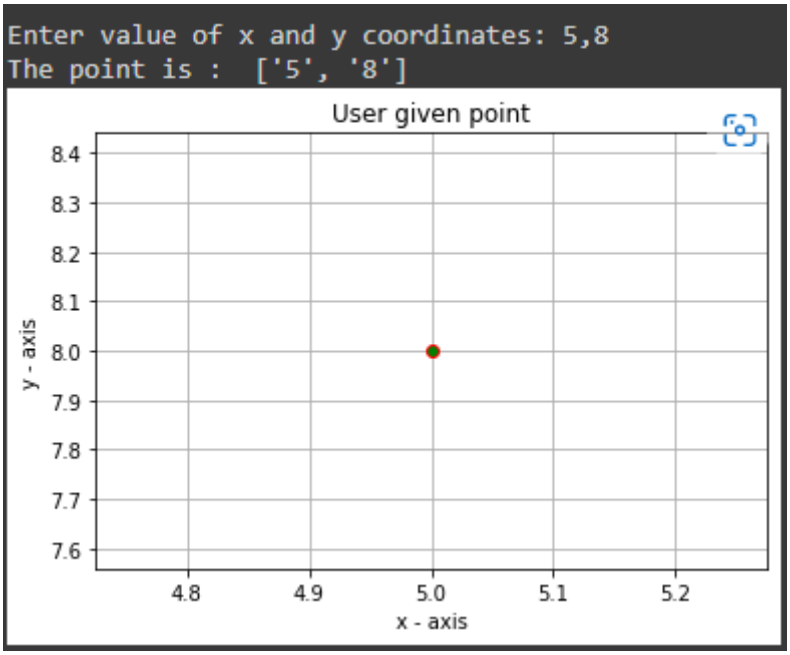
Answer

Code can be found on:
https://colab.research.google.com/drive/1kjThFwOgLdRUP8jZpVhMdwHlo2KpQpHn

1: Point

```
import matplotlib.pyplot as plt
def point():
    a = input("Enter value of x and y coordinates: ")
    P1 = a.split(",")
    x_axis = float(P1[0])
    y_axis = float(P1[1])

    print("The point is : ", P1)

    plt.xlabel('x - axis')
    plt.ylabel('y - axis')
    plt.title('User given point')
    plt.grid()
    plt.plot(x_axis, y_axis, marker="o",  markeredgecolor="red", markerfacecolor="green")
    plt.show()

point()
```

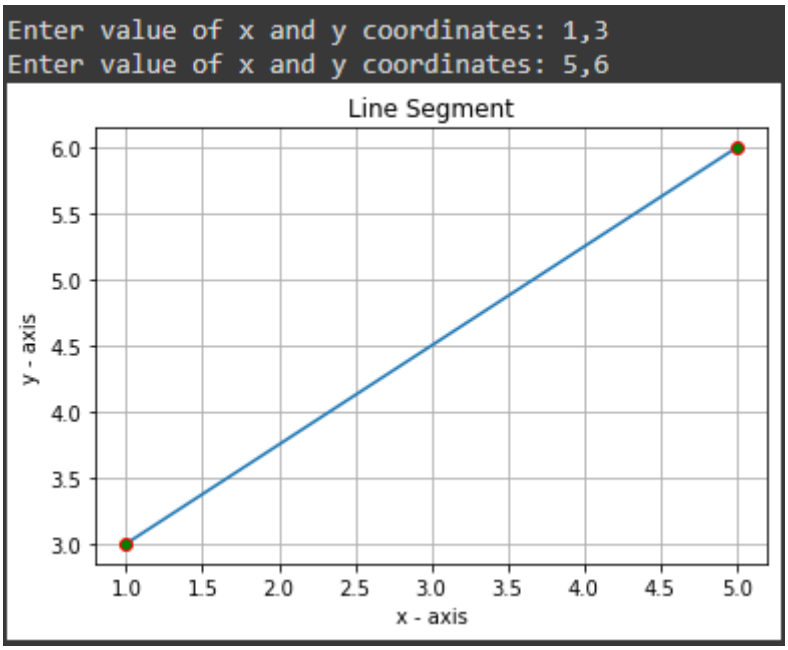
Output:



2: Line Segment

```
import matplotlib.pyplot as plt
def lineSegment():
    a = input("Enter value of x and y coordinates: ")
    P1 = a.split(",")
    x1 = float(P1[0])
    y1 = float(P1[1])

    b = input("Enter value of x and y coordinates: ")
    P2 = b.split(",")
    x2 = float(P2[0])
    y2 = float(P2[1])

    c1 = [x1, x2]
    c2 = [y1, y2]

    plt.xlabel('x - axis')
    plt.ylabel('y - axis')
    plt.title('Line Segment')
    plt.grid()
    plt.plot(c1, c2, marker="o",  markeredgecolor="red", markerfacecolor="green")
    plt.show()

lineSegment()
```

Output:

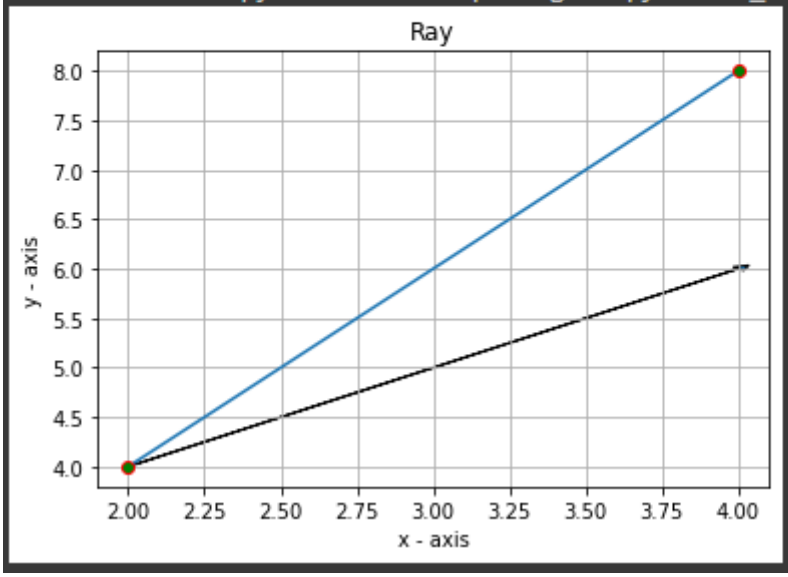


3: Ray

```
import matplotlib.pyplot as plt
def ray():
    a = input("Enter value of x and y coordinates for first point: ")
    P1 = a.split(",")
    x1 = float(P1[0])
    y1 = float(P1[1])

    b = input("Enter value of x and y coordinates for second point: ")
    P2 = b.split(",")
    x2 = float(P2[0])
    y2 = float(P2[1])

    start = [x1, x2]
    end = [y1, y2]

    print("The first point is : ", P1)
    print("The second point is : ", P2)


    slope = (y2-y1)/(x2-x1)

    plt.xlabel('x - axis')
    plt.ylabel('y - axis')
    plt.title('Ray')
    plt.grid()
    plt.plot(start, end, marker="o",  markeredgecolor="red", markerfacecolor="green")
    ax = plt.axes()
    ax.arrow(x2, y2, slope, slope, head_width=0.05, head_length=0.05 )
    plt.show()

ray()
```

Output:

```
Enter value of x and y coordinates for first point: 4,8
Enter value of x and y coordinates for second point: 2,4
The first point is :  ['4', '8']
The second point is :  ['2', '4']
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher
```



4: Line

```
import matplotlib.pyplot as plt
def line():
    a = input("Enter value of x and y coordinates for first point: ")
    P1 = a.split(",")
    x1 = float(P1[0])
    y1 = float(P1[1])

    b = input("Enter value of x and y coordinates for second point: ")
    P2 = b.split(",")
    x2 = float(P2[0])
    y2 = float(P2[1])

    start = [x1, x2]
    end = [y1, y2]

    infinity1 = [x1-5,x2+5]
    infinity2 = [y1-5,y2+5]

    print("The first point is : ", P1)
    print("The second point is : ", P2)

    fig, ax = plt.subplots()
    ax.scatter(start, end)
    label = ["P1", "P2"]

    for i, txt in enumerate(label):
        ax.annotate(txt, (start[i], end[i]))

    plt.xlabel('x - axis')
    plt.ylabel('y - axis')
    plt.title('Line')
    plt.grid()

    ax.plot(infinity1, infinity2)
line()
```

Output:

```
Enter value of x and y coordinates for first point: 1,1
Enter value of x and y coordinates for second point: 5,5
The first point is :  ['1', '1']
The second point is :  ['5', '5']
```