

1.5.29

Nipun Dasari - EE25BTECH11042

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Question

The coordinates of the point P dividing the line segment joining the points A (1, 3) and B (4, 6), in the ratio 2 : 1 are

Equation

$$\mathbf{P} = \frac{m\mathbf{A} + n\mathbf{B}}{m + n} \quad (1)$$

Theoretical Solution

Thus by formula

$$\mathbf{P} = \frac{1}{3} \left(\begin{pmatrix} 1 \\ 3 \end{pmatrix} + 2 \begin{pmatrix} 4 \\ 6 \end{pmatrix} \right) \quad (2)$$

$$\mathbf{P} = \frac{1}{3} \left(\begin{pmatrix} 1 \\ 3 \end{pmatrix} + \begin{pmatrix} 8 \\ 12 \end{pmatrix} \right) \quad (3)$$

$$\mathbf{P} = \frac{1}{3} \begin{pmatrix} 9 \\ 15 \end{pmatrix} \quad (4)$$

$$\therefore \mathbf{P} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \quad (5)$$

C Code - Section formula function

```
// section_formula.c
#include <stdio.h>

void find_section_point(double x1, double y1, double x2, double
    y2, double m, double n, double* x, double* y) {
    *x = (m * x2 + n * x1) / (m + n);
    *y = (m * y2 + n * y1) / (m + n);
}
```

Python Code through shared output

```
import ctypes
import numpy as np
import matplotlib.pyplot as plt

# Load the shared library
lib = ctypes.CDLL(./line_division.so)

# Define argument and return types
lib.divide_point.argtypes = [ctypes.c_float, ctypes.c_float,
                             ctypes.c_float, ctypes.c_float,
                             ctypes.c_float, ctypes.c_float,
                             np.ctypeslib.ndpointer(dtype=np.float32, ndim=1, flags=
                                C_CONTIGUOUS)]
lib.divide_point.restype = None

# Given points A and B
x1, y1 = 1.0, 3.0 # Point A
x2, y2 = 4.0, 6.0 # Point B
```

Python code : Direct

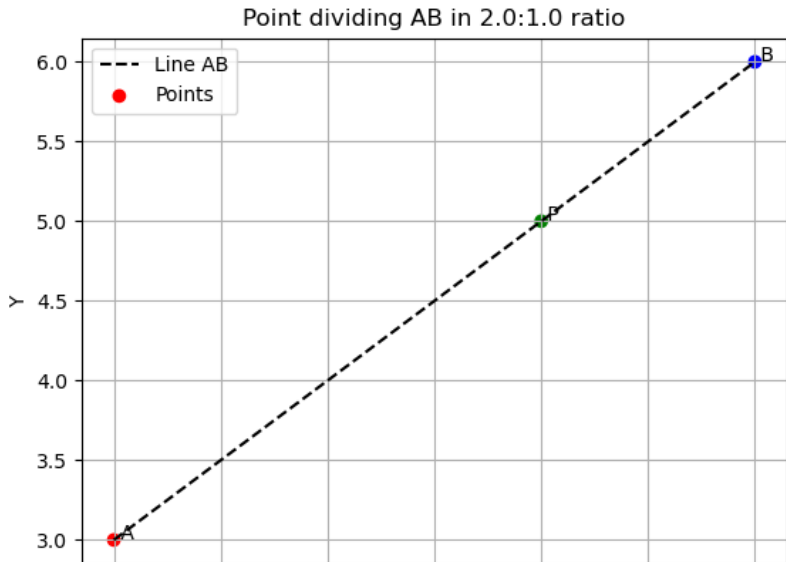
```
import sys
sys.path.insert(0, '/home/nipun-dasari/Matgeo/matgeo/codes/
CoordGeo')

import numpy as np
import numpy.linalg as LA
import matplotlib.pyplot as plt
import matplotlib.image as mpimg

#local imports
from line.funcs import *
from triangle.funcs import *
from conics.funcs import circ_gen

#Given points
A = np.array([1,3]).reshape(-1,1)
B = np.array([4,6]).reshape(-1,1)
```

Plot by python using shared output from c



Plot by python only

