1.5.29

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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

$$\mathbf{P} = \frac{m\mathbf{A} + n\mathbf{B}}{m+n} \tag{1}$$

Theoretical Solution

Thus by formula

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

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

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

$$\therefore \mathbf{P} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \tag{5}$$

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

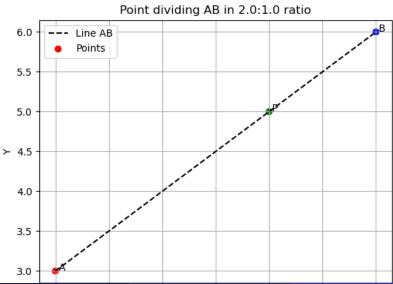
```
import ctypes
import numpy as np
import matplotlib.pyplot as plt
# Load the shared library
lib = ctypes.CDLL(./line_division.so)
# Define argument and return types
lib.divide_point.argtypes = [ctypes.c_float, ctypes.c_float,
    ctypes.c_float, ctypes.c_float,
ctypes.c float, ctypes.c float,
np.ctypeslib.ndpointer(dtype=np.float32, 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

