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Assignment-7

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Problem Statement:

If the length of three sides of a trapezium other than the base is 10 cm each,find the area of the trapezium,when it is maximum.

$$\boxed{\text{Maxima} = 129.9038} \tag{5}$$

$$\boxed{\text{Maxima Point} = 1.0472} \tag{6}$$

Solution

Gradient Ascent

$$f(x) = 100sinx + 50sin2x \tag{1}$$
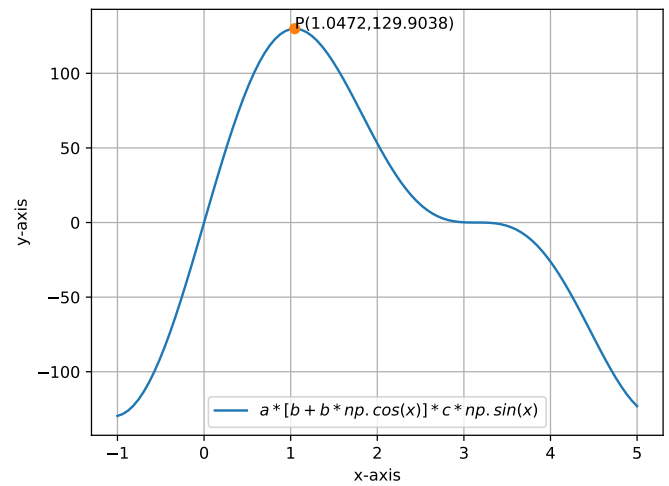
$$f'(x) = 100cosx + 100cos2x \tag{2}$$

we have to attain the maximum value of area of trapezium. This can be seen in Figure.Using gradient ascent method we can find its maxima.

$$x_{n+1} = x_n + \alpha \nabla f(x_n) \tag{3}$$

$$\implies x_{n+1} = x_n + \alpha(100(cosx + cos2x)) \tag{4}$$

Taking $x_0 = 0.5, \alpha = 0.001$ and precision = 0.00000001, values obtained using python are:

Download the code
Github link: Assignment-7.