optimization Assignment

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Problem Statement **-The maximum volume of right circular cone having slant height 3m is**

Solution

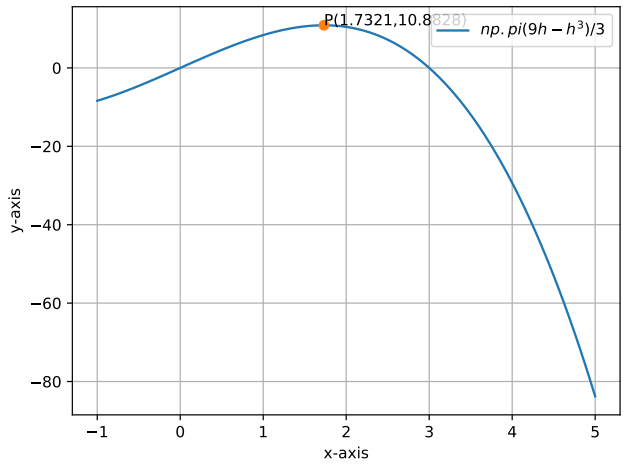

Figure 1:

By Using Pythagoras theorem,we get

$$h^2 + r^2 = 3^2 \tag{1}$$

$$r^2 = 9 - h^2 \tag{2}$$

volume of cone

$$V = \frac{1}{3}\pi r^2 h \tag{3}$$

Now,let us substitute above attained value of r in the volume

$$V = \frac{1}{3}\pi(9 - h^2)h \tag{4}$$

$$\tag{5}$$

$$V = \frac{1}{3}\pi(9h - h^3) \tag{6}$$

Gradient Ascent Method

$$x_{n+1} = x_n + \alpha\nabla f(x_n) \tag{7}$$

$$x_{n+1} = x_n + \alpha\nabla(\frac{(9x_n - x_n^3)\pi}{3}) \tag{8}$$

Taking $x_0 = 1, \alpha = 0.001$ and $precision = 0.00000001$, values obtained using python are:

$$\boxed{\text{Maxima} = 10.88} \tag{9}$$

$$\boxed{\text{Maxima Point} = 1.732} \tag{10}$$