Optimization Assignment

Panjugala Shashikala

October 2022

1 Question

The function $f(x) = \int_{-1}^{x} t(e^t - 1)(t-1)(t-2)^3(t-3)^5\,dt$
has a local minimum at x =

2 Solution

STEP-1 The given function **f(x)** is

$$f(x) = \int_{-1}^{x} t(e^t - 1)(t-1)(t-2)^3(t-3)^5\,dt \tag{1}$$

Using gradient descent method we can find its minima,

$$x_{n+1} = x_n - \alpha \nabla f(x_n) \tag{2}$$
$$\implies x_{n+1} = x_n - \alpha \left(x(e^x - 1)(x-1)(x-2)^3(x-3)^5\right) \tag{3}$$

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

$$\boxed{\text{Minima} = -6967.5283} \tag{4}$$
$$\boxed{\text{Minima Point} = 1.0} \tag{5}$$

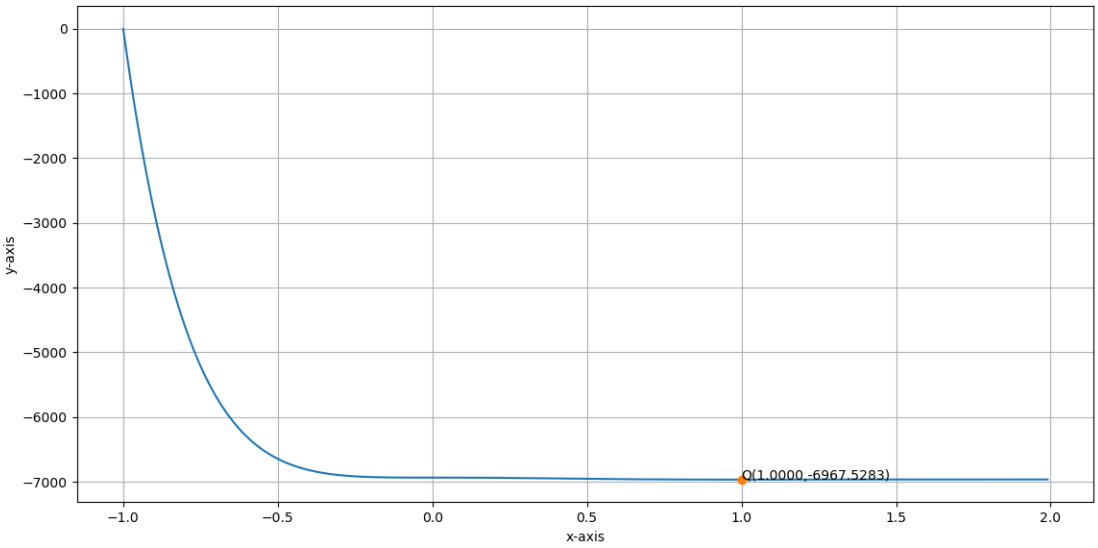

Figure 1: plot of f(x) with minima