

GDB No.2

Solution

Question:

Calculate the maximum and minimum values of $f(x) = -6x + x^2$ in the interval $[0, 5]$. Investigate whether there exists any relative minima or maxima outside the interval $[0, 5]$.

Solution:

The given function is

$$f(x) = -6x + x^2$$

Its derivative is

$$f'(x) = -6 + 2x$$

For finding the maxima or minma in $[0, 5]$,

$$f'(x) = 0$$

$$-6 + 2x = 0$$

$$2x = 6$$

$$x = 3 \quad \text{which is the critical point.}$$

The maxima or minima lie on critical points $x = 3$ or the end points $x = 0, x = 5$.

So,

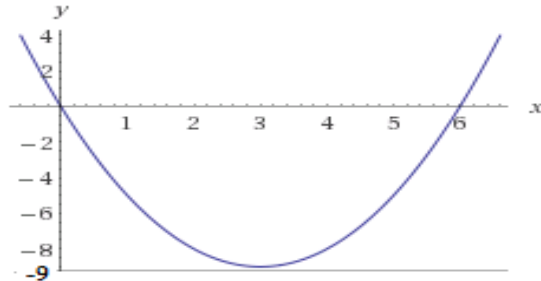
$$f(3) = -6(3) + (3)^2 = -18 + 9 = -9$$

$$f(0) = -6(0) + (0)^2 = 0 + 0 = 0$$

$$f(5) = -6(5) + (5)^2 = -30 + 25 = -5$$

Therefore, the maxima is 0 and minima is -9 on the interval $[0, 5]$.

$f(x) = -6x + x^2$ is the parabola



$x = 3$ is the relative minima which lies in the interval $[0, 5]$. But the graph clearly shows that it comes from $-\infty$ to ∞ . So $f(x)$ has no relative maxima outside the given interval.