This chapter Application of derivatives mainly features a set of topics just like the rate of change of quantities, Increasing and decreasing functions, Tangents and normals, Approximations, Maxima and minima, and lots more. We are going to discuss the important concepts of the chapter application of derivatives.

1. A function f is said to be

    a. Increasing only if on an interval of (a, b) if $x_1 < x_2$
    b. Decreasing on (a,b) if $x_1 < x_2$
    c. Let the constant (a, b), if f (x) equals c for all x ∈ (a, b), where c is the constant.

2. First Derivative Test.

3. Second Derivative Test.

Maximum and Minimum Value

Let f be the function which is defined on an interval I. So,

I. f is claimed to possess a maximum value in I, if there exists some extent c in I such: f(c) > f(x), ∀ x ∈ I. The number f(c) is named the utmost value of f in I and therefore the point c is named to some extent a maximum value of f in I.
II. f is said to be having a minimum value in I, and if there exists a point c in I so f(c) < f(x), ∀ x ∈ I. The number f(c) is named the minimum value of f in I and therefore the point c is named to some extent the minimum value of f in I.
III. f is claimed to possess an extreme value in I, if there exists some extent c in I such f(c) is either a maximum value or a minimum value of f in I. The number f(c) is named an extreme value off in I and therefore the point c is named an extreme.

Important Points of Applications of Derivatives

I. Through the graphs, we will even find the maximum/minimum value of a function to some extent at which it's not even differentiable.

II. Every monotonic function makes sure that its maximum/minimum value is at the endpoints of the domain of the definition of the function.

Every continuous function on a bounded interval features a maximum and a minimum value.

Let f be a function which is defined on an unbounded interval which is I. Suppose cel is any point. If f has local maxima or local minima at x = c, then either f'(c) = 0 or f isn't differentiable at c.

Critical Point: to some extent c within the domain of a function f at which either f'(c) = 0 or f isn't differentiable, is named a juncture of f.

First Derivative Test: Let f be a function defined on an unbounded interval which is I and f be the continuous of a juncture c in I. So, if f'(x) changes sign from positive to negative as x increases through c, then c may be a point of local maxima.

if f'(x) changes sign from negative to positive as x increases through c, then c may be a point of local minima.

if f'(x) doesn't change sign as x increases through c, then c is neither some extent of local maxima nor some extent of local minima. Such some extent is named some extent of inflection.

Second Derivative Test: Let f(x) be a function that is defined on an interval known as I and $c \in I$. Let f be two times differentiable at c. So,

I. x = c is a point for the local maxima, if f'(c) equals 0 and f''(c) < 0.
II. x = c is a point for the local minima, if f'(c) equals 0 and f''(c) > 0.
III. The test will fail if f'(c) equals 0 and f''(c) equals 0.