Maxima & Minima

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 6
CHAPTER NAME : Application of Derivatives

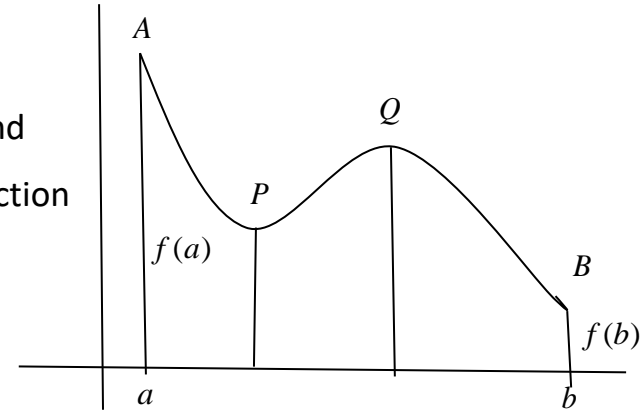## Absolute Maxima and Absolute Minima of a function

Let $y = f(x)$ be a function defined on $[a, b]$. By local maximum (or local minimum) value of the function at a point $c \epsilon [a, b]$ we mean the greatest or least value in the immediate neighborhood of $x = c$. It does not mean greatest or maximum(or the least or the minimum) of $f(x)$ in the interval $[a, b]$. A function may have a number of local maximum or local minimum in a given interval even a local minimum may greater than local maximum.

Thus, a local maximum value may not be greatest (the maximum) value and Local minimum value may not be the least (the minimum) value of the function in any given interval as shown in figure.

Working rules to find out Absolute Maxima and Absolute Minima.

We may use the following working rules for finding out the maximum (absolute maximum) and the minimum (absolute minimum) of a function f defined on closed interval $[a, b]$.

STEP-1

Find $f'(x) = \frac{dy}{dx}$

STEP-2

Take $f'(x)$ and find all values of x , let $c_1, c_2, c_{3,\dots\dots\dots} c_n$ be the values of x .

STEP-3

Take the maximum and minimum values out of the values $f(a), f(c_1), f(c_2), \dots\dots f(c_n), f(b)$,

The maximum and minimum values obtained is the absolute maximum or largest value and absolute minimum or smallest value of the function.

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Find the absolute maximum and minimum values of a function f given by $f(x) = 2x^3 - 15x^2 + 36x + 1$
on the interval [1,5]

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Find the absolute maximum and minimum values of a function f given by $f(x) = 12x^{\frac{4}{3}} - 6x^{\frac{1}{3}}$, $x\epsilon[-1,1]$

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Find the absolute maximum and minimum values of a function f given by $f(x) = Sinx + Cosx \ in \ [0, \pi]$

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Q1. Find the maximum value and minimum value of $f(x) = x + Sin2x$ in the interval $[x, 2\pi]$

Q2. Find the absolute maximum and minimum values of a function f given by

$f(x) = 3x^4 - 8x^3 + 12x^2 - 48x + 1$ on the interval [1,4]

Q3. Find the absolute maximum and minimum values of a function f given by

$f(x) = (x - 2)\sqrt{x - 1}$ on the interval [1,9]

THANKING YOU

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