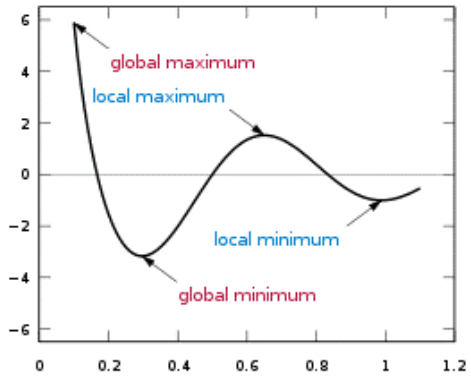
Buy from flipkart.com

MAXIMA AND MINIMA (1ST DERIVATIVE TEST)

Created: Thursday, 17 November 2011 07:22 | Published: Thursday, 17 November 2011 07:22 | Written by Super User | Print

Introduction

Local maxima and local minima



Let ‘f’ be a real valued function and let ‘c’ be an interior point in the domain of ‘f’, then
- ‘c’ is called a point of local maxima if there is an h > 0 such that f(c) > f(x), for all x in (c - h, c + h). The value of f at x = c is called the **local maximum value**.
- ‘c’ is called a point of local minima if there is an h > 0 such that f(c) < f(x) for all x in (c - h, c + h). The value of ‘f’ at x = c is called the **local minimum value**.

Critical Point

A point ‘c’ in the domain of a function ‘f’ at which either f’(c) = 0 or ‘f’ is not differentiable is called a critical point of ‘f’.

First Derivative Test

Let ‘f’ be a function defined on an open interval I. Let ‘f’ be continuous at a critical point ‘c’ in I. Then
- If f’(x) > 0 at every point sufficiently close to the left of c and f’(x) < 0 at every point sufficiently close to the right of ‘c’ then ‘c’ is a point of local maxima.
- If f’(x) < 0 at every point sufficiently close to the left of c and f’(x) > 0 at every point sufficiently close to the right of c, then ‘c’ is a point of local minima.
- If f’(x) does not change sign as x increases through c, then c is neither a point of local maxima nor a point of local minima. Such a point is calledpoint of inflection.

Solved Example:
Find all points of local maxima and local minima of the function ‘f’ given by
$f(x) = x^3 - 3x + 3$
$f'(x) = 3x^2 – 3 = 3(x + 1)(x - 1)$
f’(x) = 0 implies x = 1 and x = -1

Values of x	Sign of f’(x)
Right to 1	>0
Left to 1	<0

Since the value of f'(x) < 0 to the left of 1 and f'(x) >0 to the right of 1, x = 1 is a point of local minima and f(1) is the local minimum value.
Since the value of f'(x) > 0 to the left of -1 and f'(x) < 0 to the right of -1, x = -1 is a point of local maxima and f(-1) is the local maximum value

Maximum value = 5
Minimum value = 1

Now try it yourself! Should you still need any help, click here to schedule live online session with e Tutor!

About eAge Tutoring:

eAgeTutor.com is the premium online tutoring provider. Using materials developed by highly qualified educators and leading content developers, a team of top-notch software experts, and a group of passionate educators, eAgeTutor works to ensure the success and satisfaction of all of its students.

Contact us today to learn more about our tutoring programs and discuss how we can help make the dreams of the student in your life come true!

Reference Links:

- http://en.wikipedia.org/wiki/Domain_(ring_theory)
- http://deadline.3x.ro/maxima-minima.html
- http://mathworld.wolfram.com/LocalMinimum.html
- http://en.wikipedia.org/wiki/Inflection_point
- http://en.wikipedia.org/wiki/First_derivative_test

Category:ROOT

Joomla SEF URLs by Artio