Day 21 is Monday, October 15, 2012

Section 5-1 First Derivatives & Graphs, Continuing.

More terminology

Define "Partition Number"

words: c is a partition number for the function g.

meaning: Either $g(c)=0$ or $g(c)$ DNE.

Use this terminology to rewrite our definition of critical value

Definition of "Critical Value"

words: c is a critical value for the function f.

meaning: Both of the following are satisfied

- $f'(c)=0$ or $f'(c)$ DNE. That is, $x=c$ is partition number for f'.
- $f(c)$ exists

The First Derivative Test

A function f will have a local max or min at some $x=c$ only when the following three conditions are all met.

- $f'(c)=0$ or $f'(c)$ DNE (that is, $x=c$ is partition number for f')
- $f(c)$ exists

(that is, $x=c$ is a critical value for f)

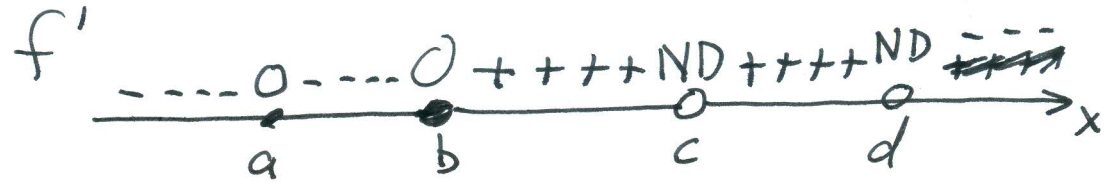
- f' changes sign at $x=c$.

Final example involving graphical approach

Exercise 5-1 #10

Given info: f is continuous for all x-values

The sign chart for f' is



Find x-coordinates of maxes

Find x-coordinates of mins.

Solution

- We see that $f'(x)=0$ or $f'(x)$ DNE at $X=a,b,c,d$
  Those are the partition numbers for f'.
- because f is known to be continuous, we know that $f(x)$ exists at every x-value.
  So we know that $X=a,b,c,d$ are all critical values for f.