Prior Knowledge for Regression Absolute Minimum of a Function

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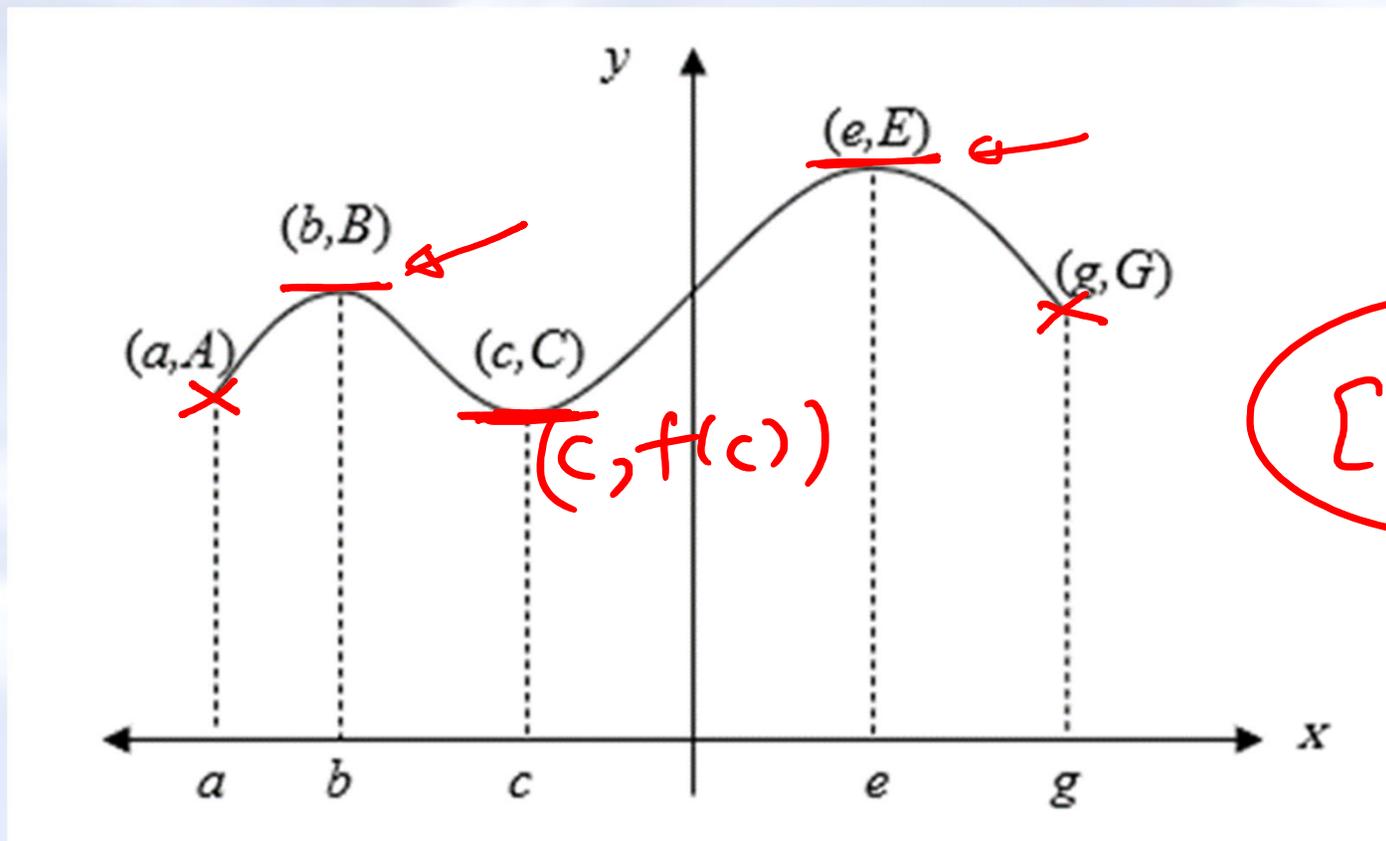Open Education Resources

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➢ Click on Prerequisites to Regression

Absolute Minimum Value

Given a function $f(x)$ with domain D, then $f(c)$ is the absolute minimum on D if and only if $f(x) \geq f(c)$ for all x in D.

Finding the absolute minimum of functions for regression

- In the regression models we will be discussing in the course, we will only find the absolute minimum of functions that are continuous and differentiable.

- So, we will first look for critical points where $f'(x) = 0$ and could be local extreme (local minimum or local maximum) values.

- If $f''(x) > 0$ at any of these points where local extremes occur, then it corresponds to a local minimum.

- Out of all the local minimum and domain end function values, one can find the minimum of all such values. The point where this minimum exists is then the location of the absolute minimum value, and the value of the function at that point is the absolute minimum of the function.

$$(x_m), \ f(x_m)$$

Example

Find the location of the absolute minimum of a polynomial $25 - 20x + 4x^2$.

$$f(x) = 25 - 20x + 4x^2$$

$(-\infty, \infty)$

$$f'(x) = \frac{-20 + 8x}{}$$

$$f'(x) = 0 \longrightarrow -20 + 8x = 0 \Rightarrow \underline{x = 2.5}$$

$$\boxed{x = 2.5}$$

$$f''(x) = 8x$$

$$f''(2.5) = 8(2.5) = 20 > 0$$

$$\boxed{x = 2.5} \longleftarrow \text{local min.}$$

$$\text{Yes.} \longleftarrow \text{abs. min.}$$

END

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