coursera

Extrema: Clearing the Air

Let us state several things about function's extrema to summarise all known up till this moment:

1. The **extremum** is **locally** greatest (or lowest value). The definition itself does not call for any differentiability.
2. If the function is **differentiable** in the **extremum** point, then $f'(a) = 0$.
3. The inverse is not necessarily true: if the function has $f'(a) = 0$ it **does not** imply the extremum at this very point; example $f(x) = x^3$
4. Similar thing applies for the differentiability: the differentiability is not a **necessity** for the extremum, example: $f(x) = |x|$
5. You can come up with a workaround for the latter case: assume that you find an extremum not via the value of the derivative in the point, but via **changing the sign of the derivative** as argument passes through given point (thus *monotonic behaviour changes*)
6. It is still not enough: one can come up with a function with **no certain monotonicity** in either left or right neighbourhoods (any). Think of the function exploiting $\sin 1/x$.

Mark as completed