PROPERTIES OF THE INTERMEDIATE POINT FROM THE MEAN VALUE THEOREM

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Abstract. Let I be an interval in $\mathbb{R}$, and $a \in I$. If the function $f : I \to \mathbb{R}$ is $n \geq 1$ times differentiable on the interval $I \subseteq \mathbb{R}$, then there exist the functions $c : I \to \mathbb{R}$ and $\theta : I \to]0, 1[$ such that, for each $x \in I$, we have

$$f(x) = \sum_{k=1}^{n-1} \frac{f^{(k)}(a)}{k!} (x-a)^k + \frac{f^{(n)}(c(x))}{n!} (x-a)^n ,$$

and

$$f(x) = \sum_{k=1}^{n-1} \frac{f^{(k)}(a)}{k!} (x-a)^k + \frac{f^{(n)}(a + (x-a)\,\theta(x))}{n!} (x-a)^n .$$

In this talk we study the differentiability of the functions c and θ in a neighbourhood of a.