Fachbereich Mathematik
Dr. L. Leuştean
K. Altmann, E. Briseid, S. Herrmann

TECHNISCHE
UNIVERSITÄT
DARMSTADT

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3. Home work Analysis II for MCS
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(H3.1) Let I be a real interval, let $n \in \mathbb{N}$ and let $f : I \to \mathbb{R}$ be a $(n+1)$-times differentiable function with $f^{(n+1)} = 0$. Show that f is a polynomial of degree not greater than n.

(H3.2) Compute the following limits:

(i) $\lim\limits_{\substack{x \to 1 \\ x \neq 1}} \dfrac{x^x - x}{1 - x + \log x}$; (ii) $\lim\limits_{\substack{x \to 0 \\ x \neq 0}} \dfrac{x - \sin x}{x \sin x}$.

Hint: Use the Rule of Bernoulli and de l'Hôpital.