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Another Refinement of Bernstein's Inequality

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Abstract:

Given a polynomial $p(z) = \sum_{j=0}^{n} a_j z^j$, we denote by $\| \ \|$ the maximum norm on the unit circle $\{z: \ |z| = 1\}$. We obtain a characterization of the best possible constant $x_n \geq \frac{1}{2}$ such that the inequality $\|xp'(z) - xa_n z^n\| \leq (n-x)\|p\|$ holds for $0 \leq x \leq x_n$.